DW:98:0327

L. S. Kutina	AOC-24
S. G. Schneider	AOC-24

Department of Energy

Recd.
Rec. Mgmt.
May 13, 1998

Ohio Field Office
West Valley Area Office
P.O. Box 191
West Valley, NY 14171

DW:98:0327

May 12, 1998

Mr. Robert R. Campbell, President
West Valley Nuclear Services Co., Inc.
P.O. Box 191
West Valley, NY 14171-0191

ATTENTION: S. G. Schneider, Environmental Affairs Manager, AOC-24

SUBJECT: Permit WVDP#387-01 - Supernatant Treatment System Permanent Ventilation System (STS/PVS)

REFERENCE: Letter 57481, J. M. Fox to T. J. Rowland, "Permit WVDP#387-01 - Supernatant Treatment System Permanent Ventilation System," dated May 4, 1998

Dear Sir:

The referenced letter is for your information. It specifically allows for Tanks 8D-1 and 8D-2 to be vented on all occasions through the STS/PVS.

Please contact Moira Maloney on Extension 4255 with any questions.

Sincerely,

Elizabeth Lowes

E. A. Lowes, Team Leader
Regulatory Planning and Stakeholder Interface Team

Enclosure: Referenced Letter

MNM:080 - 57493 - 454.2.2

MNM/bma

WR:91:0099

October 16, 1991

Fc 9 3-1

Mr. Paul Giardina
Radiation Program Manager
United States Environmental
Protection Agency
Region II
26 Federal Plaza
New York, New York 10278

Dear Mr. Giardina:

SUBJECT: Air Emission Dose Commitment Models for 8D-4 Steam Jet Removal and Riser Modifications Project; Liquid Waste Treatment System (LWTS) Evaporator Cleaning Project; and 8D-2 Sludge Mobilization and Wash System Process

References: Letter FJ:91:0258, G. G. Baker to P. Giardina, "Minutes from May 29, 1991, U.S. Environmental Protection Agency (EPA) National Emission Standard for Hazardous Air Pollutants (NESHAP) Annual Inspection," dated August 8, 1991

Attached are information packages and air emission dose commitment models for the three subject projects at the West Valley Demonstration Project (WVDP). As discussed during our annual inspection, these information packages are being transmitted for your files.

Should you have any questions or require additional information, please contact either E. A. Matthews of the U. S. Department of Energy at FTS 473-4930 (commercial (716) 942-4930), or me at FTS 473-4291 (commercial (716) 942-4291).

Very truly yours,

Gary G. Baker, PhD.
Manager, Environmental Compliance
West Valley Nuclear Services Co., Inc.

FJ:91:0363

MKL:jep

Attachments

Attachment 1 - 8D-4 Steam Jet Removal and Riser Modifications Project

EP0261

Attachment 2 - Liquid Waste Treatment System (LWTS) Evaporator Cleaning Project

Attachment 3 - 8D-2 Sludge Mobilization and Wash System

cc: J. A. Yeazel - DOE/WVPO
R. B. Provencher - DOE/WVPO
T. J. Rowland - DOE/WVPO

Attachment 1

8D-4 Steam Jet Removal and Riser Modifications Project

To make room for the pump that will be used to transfer liquid from high-level waste (HLW) tank 8D-4 in preparation for vitrification, the upper part of the steam jet, currently inside a riser on top of the tank, must be removed and the riser modified. The riser extends above the tank and above the concrete vault containing tanks 8D-3 and 8D-4. Tank 8D-4 contains 51,000 liters (13,500 gallons) of acidic HLW from spent thorium fuel reprocessing (Thorex). Table 1-2 lists the inventory of significant radionuclides in the tank. A general arrangement plan for the steam jet removal is provided in Drawing 900D-4253.

Ventilation and multiple barrier containment systems will be the primary means of preventing airborne radiological contamination and spread of surface radiological contamination. The modification will be performed inside ventilated glove boxes or glove bags whenever the potential for contamination exists. These primary containment systems will be located inside ventilated PVC enclosures, which will provide secondary containment. The entire operation will be conducted inside a temporary weather shelter to provide additional control.

Ventilation will be provided by three systems: the waste tank farm ventilation system (WTFVS); a temporary riser ventilation system (TRVS); and a portable ventilation unit (PVU). The TRVS will be installed at the base of the riser just above the vault. The WTFVS will be isolated from tanks 8D-3 and 8D-4 when the riser is open. Whenever the riser is open, the TRVS will draw air through the top of the riser and a glove box at a rate of 50-100 cfm (85-170 m^3/hr) and exhaust it to the intake of the PVU. The TRVS will be equipped with two HEPA filters in series and a blower. Accumulation of moisture in the HEPA filters will be minimized by sloping the vent line back to the riser. The PVU, which includes a HEPA filter, will operate at approximately 1,000 cfm (1,700 m^3/hr) and draw air from both the containment tent and the TRVS exhaust. The exhaust from the PVU will be vented to atmosphere.

Air flow will be from cleaner areas to progressively more radiological contaminated areas (from the outside, air will flow into the weather structure, into the containment tent, into the glove box, and finally into the riser). Radiologically contaminated air will pass through the three HEPA filters (two in the TRVS and one in the PVU) prior to being exhausted to the atmosphere. When the riser is open, air flow into the riser, glove box, and containment tent openings will be maintained at a minimum of 150 feet per minute (0.76 m/sec).

No significant increase in off-site releases of radionuclides from the site are anticipated during this modification. Tank 8D-4 is normally ventilated using the WTFVS, which consists of one bank of HEPA filters, a scrubber, and exhausts through stack 15F-1. The addition of the TRVS does not constitute a significant modification requiring an application to modify under 40 CFR 61 (NESHAP). Net emissions may actually decrease as a result of the additional filtration provided.

The proposed activity will generate a chemical emission of nitric acid vapor. The estimated discharge of nitric acid fumes to atmosphere as a result of the proposed activity is 0.07 lbs/hr, or a total of 2.58 lbs. The calculation for this estimate is attached. Note, the calculation assumes a 60 SCFM flow over the fluid surface and 100% of the NO_x exiting the TRVS. Both assumptions are extremely conservative.

Chemical emissions are exempt from state permitting requirement to obtain an air permit. The basis for this exemption is that the WVDP is regulated under 6 NYCRR, Parts 201 and 212. These parts deal with permanent or long-term emission sources. This project's scope being short-term and having negligible environmental impact, allowed the state to grant a permitting exemption.

Basis of the Chemical Emission Calculations

Determination of required flow:

$$Q = AV$$
$$= (0.35\ ft^2)(150\ fpm)$$
$$= 52.5\ SCFM$$

(For the purpose of the calculation use 60 SCFM)

Determination of Nitric Acid Vapor in the Ventilation Air:

Using Perry's Handbook, the partial pressure of 20% HNO_3 solution at 55 degrees C is 0.09. The actual concentration of HNO_3 in Tank 8D-4 is 3%. The 20% concentration is used to be conservative (the vapor pressure is not listed for concentrations less than 20%).

$$\text{Vapor Evolution} = \frac{(0.09\ mm\ Hg)(60\ SCFM)}{(760\ mm\ Hg)}$$

$$= 0.007\ SCFM$$

From the Ideal Gas Laws

$$22.4\ L = 0.791\ ft^3 \text{ of } HNO_3 \text{ at } 63\ g$$

therefore:

$$HNO_3 \text{ Vapor Rate} = \frac{(0.007\ SCFM)}{0.7911\ CF} \times \frac{(63g)}{454\ g/Lb} \times (60\ min/hr)$$

$$= 0.07\ lbs/hr$$

The expected duration of this job is two weeks. During this period, the PVU will not be in constant operation. It will be in service for 36 hours (a conservative estimate based on the expected time that the riser will be open and thus requiring additional ventilation). The total Nitric acid vapor emission for the modification will be 2.58 lbs (0.07 lbs/hr x 36 hrs in operation).

-0261

Basis of NESHAP Evaluation

The attached calculations were performed to estimate potential doses to off-site residents due to airborne emissions from the Temporary Riser Ventilation System (TRVS) during the Tank 8D-4 steam jet removal and riser modifications. The TRVS is expected to be operational for less than 36 hours total; the entire operation should be completed within a two week period.

The amount of activity released (source term) is estimated in Table 1-2 using the following assumptions:

- The HLW evaporation rate was based on the volumetric flow rate through the TRVS, assuming all this air starts off dry, warms up to 110°F (the liquid temperature) and becomes saturated with HLW vapor.

- An emission factor of 0.001 (per Appendix D to 40 CFR 61) was applied to the concentration in the liquid state to obtain the equivalent concentration in the vapor state.

- The concentration in the vapor state was multiplied by the evaporation rate to estimate the radionuclide rate to the TRVS intake. The above assumptions are very conservative and do not account for the operation in parallel of the Waste Tank Farm Ventilation System. Actual release rates are expected to be significantly lower.

- An adjustment factor of 0.01 (per Appendix D to 40 CFR 61) was applied to this release rate for each of 3 HEPA filters in series (10^{-6} total) between air intake and outlet. These factors are more conservative than recommended values in the ANSI guidance for HEPA filters.

- The release over a 36-hour operational period was calculated for Sr-90; other radionuclides in the Thorex HLW contributing more than 0.1 percent of the dose were scaled to the Sr-90 based on their relative concentrations in Tank 8D-4.

The resulting source term was input to the AIRDOS-PC code. The activity of any beta-gamma emitter not available in the AIRDOS-PC data base was added to the SR-90 activity; the activity of alpha emitters not in the data base was added to the Am-241 activity. Four-year annual average (1987-1990) wind data from the onsite met tower were input to the code. The resulting dose is estimated to be less than 6 x 10^{-5} mrem/year to the maximally exposed off-site individual, located 1900 m NNW from the emission point. Actual emissions will be monitored at the PVU exhaust per the existing Standard Operating Procedure.

It should be noted that the use of annual average wind data may not be appropriate for an operation of such short duration. Depending on the predominant meteorological conditions at the time of the operation, the calculated dose may be underestimated. However, any such underestimation would not be of any significance since the calculated dose is more than three orders of magnitude lower than the 0.1 mrem threshold requiring an application to construct or modify.

Table 1-1

Radionuclide Concentrations in Tank 8D-4 Ventilation System

Evaporated Thorex Volume	1.5E+02 ml/m3	Air at 110°F
Emission Fraction	1.0E-03 uCi/ml	Vapor per uCi/ml Liquid
Sr-90 Conc. in Thorex	8.0E+03 uCi/ml	Liquid
Sr-90 Conc. Evaporated	1.2E-03 uCi/ml	Tank Air
TRVS Ventilation Rate	5.0E+01 cfm	or 8.5E+01 m^3/hr
TRVS Intake Dilution Factor	1.0E+00	(Worst Case: No Dilution)
Sr-90 Conc. in TRVS Intake	1.2E-03 uCi/ml	
Sr-90 Emission TRVS Intake	1.0E+05 uCi/hr	
TRVS 2 x HEPA Decon. Factor	1.0E+04	(10,000 per ANSI/N46.1)
Sr-90 Conc. in TRVS Exhaust	1.2E-07 uCi/ml	
Sr-90 Emission TRVS Exhaust	1.0E+01 uCi/hr	
PVU Ventilation Rate	1.0E+03 cfm	or 1.7E+03 m^3/hr
PVU Intake Dilution Factor	2.0E+01	
Sr-90 Conc. in PVU Intake	6.0E-09 uCi/ml	
Sr-90 Emission PVU Intake	1.0E+01 uCi/hr	
PVU HEPA Decon. Factor	1.0E+02	(1,000 per ANSI/N46.1)
Sr-90 Conc. in PVU Exhaust	6.0E-11 uCi/ml	(DCG = 9E-12uCi/ml)
Sr-90 Emission PVU Exhaust	1.0E-01 uCi/hr	
Maximum TRVS Operation	3.6E+01 hr	
Total Emissions of Sr-90	3.7E+00 uCi	

Evaporation volume derived using Perry's Chemical Engineering Handbook. Emission fractions and adjustment factors are from Appendix D to 40 CRF 61. Table 2 and 3 in SAR-020 indicate that SR-90 contributes 59 and 54 percent of the potential occupational and off-site dose, respectively.

Table 1-2

Contributions From Other Radionuclides in Thorex
With Scale to Sr-90

Nuclide	Activity in 8D-4 Ci[1]	Source Term uCi[2]	Included in AIRDOS Database
Sr-90	4.2E+05	3.7E+00	Yes
Y-90	4.2E+05	3.7E+00	Yes
Cs-137	4.4E+05	3.8E+00	Yes
Eu-154	2.0E+03	1.7E-02	No[3]
Ac-227	8.0E+00	7.0E-05	No[4]
Th-228	6.1E+00	5.3E-05	No[4]
Th-232	1.6E+00	1.4E-05	Yes
Pa-231	1.5E+01	1.3E-04	No[4]
U-232	2.7E+00	2.4E-05	No[4]
Pu-238	4.7E+02	4.1E-03	No[4]
Pu-239	1.5E+01	1.3E-04	Yes
Pu-240	8.1E+00	7.1E-05	Yes
Pu-241	7.4E+02	6.5E-03	Yes
Am-241	2.4E+02	2.1E-03	Yes
Am-242m	6.7E+00	5.9E-05	No[4]
Am-243	7.8E+00	6.8E-05	No[4]
Cm-244	1.2E+01	1.0E-04	No[4]
Revised Sr-90	4.2E+05	3.7E+00[5]	
Revised Am-241	7.7E+02	6.7E-03[6]	

Notes:

1) From Table 1 of WVNS SAR-020
2) Scaled to Sr-90 emissions
3) Beta-gamma emitter as Sr-90
4) Alpha emitter as Am-241
5) Includes beta-gamma emitters not in AIRDOS-PC database
6) Includes alpha emitters not in AIRDOS-PC database

40 CFR Part 61
National Emission Standards
for Hazardous Air Pollutants

CLEAN AIR ACT COMPLIANCE REPORT
(Version 3.0 November 1989)

Facility: West Valley Demonstration Project (DOE)

Address: Rock Springs Road
West Valley , NY. 14171
Annual Assessment for Year: 1991
Date Submitted: 3/ 8/91

Comments: Dose Assessment for Steam Jet Removal
Temporary Ventilation

Prepared By:

Name: Ernesto R. Faillace, D.Eng.
Title: Project Nuclear Engineer
Phone #: (716) 942-4471

Prepared for:
U.S. Environmental Protection Agency
Office of Radiation Programs
Washington, D.C. 20460

CLEAN AIR ACT COMPLIANCE REPORT   3/ 8/91   8:49 AM

Facility: West Valley Demonstration Project (DOE)
Address: Rock Springs Road   City: West Valley   State: NY
Comments: Dose Assessment for Steam Jet Removal Temporary Ventilation
Year: 1991

	Dose Equivalent Rates to Nearby Individuals (mrem/year)
Effective Dose Equivalent	5.84E-05
Highest Organ Dose is to ENDOSTEUM	0.0003

------------------------EMISSION INFORMATION------------------------

Radio-nuclide	Class	Amad	Stack PVU (Ci/y)
SR-90	D	1.0	3.7E-06
Y-90	Y	1.0	3.7E-06
CS-137	D	1.0	3.8E-06
TH-232	Y	1.0	1.4E-11
PU-239	Y	1.0	1.3E-10
PU-240	Y	1.0	7.1E-11
PU-241	Y	1.0	6.5E-09
AM-241	W	1.0	6.7E-09
BA-137M	D	1.0	0.0E-01
Stack Height (m)			0.00
Stack Diameter (m)			0.25
Momentum (m/s)			0.0

------------------------SITE INFORMATION------------------------

Wind Data	AV4YR10M.WND	Temperature (C)	20
Food Source	LOCAL	Rainfall (cm/y)	94
Distance to Individuals (m)	1900	Lid Height (m)	1000

*NOTE: The results of this computer model are dose estimates. They are only to be used for the purpose of determining compliance and reporting per 40 CFR 61.93 and 40 CFR 61.94.

JEP0261

ORGAN DOSE TO THE MAXIMALLY EXPOSED INDIVIDUAL

ORGAN	DOSE EQUIVALENT RATE TO THE ORGAN (mrem/y)
GONADS	3.9E-05
BREAST	3.6E-05
RED MARROW	1.4E-04
LUNGS	3.2E-05
THYROID	3.7E-05
ENDOSTEUM	3.4E-04
REMAINDER	3.8E-05
EFFECTIVE	5.8E-05

DOSE TO THE MAXIMALLY EXPOSED INDIVIDUAL
BY PATHWAY FOR ALL RADIONUCLIDES

	EFFECTIVE DOSE EQUIVALENT (mrem/y)	DOSE EQUIVALENT TO THE ORGAN WITH THE HIGHEST DOSE ENDOSTEUM (mrem/y)
INGESTION	2.7E-05	2.3E-04
INHALATION	5.8E-06	9.2E-05
AIR IMMERSION	9.4E-14	1.3E-13
GROUND SURFACE	2.5E-05	2.5E-05
TOTAL:	5.8E-05	3.4E-04

DOSE TO THE MAXIMALLY EXPOSED INDIVIDUAL BY RADIONUCLIDE FOR ALL PATHWAYS

RADIONUCLIDE	EFFECTIVE DOSE EQUIVALENT (mrem/y)	DOSE EQUIVALENT TO THE ORGAN WITH THE HIGHEST DOSE ENDOSTEUM (mrem/y)
SR-90	2.1E-05	2.3E-04
Y-90	4.5E-08	2.6E-10
CS-137	7.6E-06	5.0E-06
TH-232	6.3E-09	5.5E-08
PU-239	6.1E-08	6.7E-07
PU-240	3.3E-08	3.6E-07
PU-241	4.8E-08	7.4E-07
AM-241	4.8E-06	8.4E-05
BA-137M	2.5E-05	2.5E-05
TOTAL :	5.8E-05	3.4E-04

EFFECTIVE DOSE EQUIVALENT AS A FUNCTION OF DISTANCE IN THE DIRECTIONS OF THE MAXIMALLY EXPOSED INDIVIDUAL FOR ALL RADIONUCLIDES AND ALL PATHWAYS

DIRECTION : NORTH

DISTANCE (meters)	EFFECTIVE DOSE EQUIVALENT (mrem/y)
1900	5.8E-05
3000	2.5E-05
10000	2.8E-06
80000	6.2E-08

EFFECTIVE DOSE EQUIVALENT AS A FUNCTION OF ALL DISTANCES AND ALL DIRECTIONS FOR ALL RADIONUCLIDES AND ALL PATHWAYS

DIRECTIONS: DISTANCE (METERS):	N	NNE	NE	ENE	E	ESE	SE	SSE
1900	5.8E-05	2.6E-05	1.7E-05	1.1E-05	1.1E-05	1.2E-05	1.7E-05	9.7E-06
3000	2.5E-05	1.2E-05	8.2E-06	5.3E-06	5.1E-06	5.8E-06	8.5E-06	4.8E-06
10000	2.8E-06	1.7E-06	1.3E-06	8.4E-07	8.4E-07	1.0E-06	1.6E-06	9.4E-07
80000	6.2E-08	4.9E-08	4.3E-08	2.7E-08	2.6E-08	3.8E-08	7.5E-08	5.3E-08

DISTANCE (METERS):	S	SSW	SW	WSW	W	WNW	NW	NNW
1900	3.5E-06	2.0E-06	2.2E-06	1.8E-06	2.7E-06	3.9E-06	1.1E-05	4.7E-05
3000	1.7E-06	9.8E-07	1.1E-06	8.7E-07	1.3E-06	1.8E-06	5.0E-06	2.1E-05
10000	3.3E-07	1.8E-07	2.0E-07	1.5E-07	2.1E-07	2.8E-07	7.4E-07	2.2E-06
80000	1.7E-08	8.2E-09	9.2E-09	6.7E-09	7.7E-09	9.2E-09	2.4E-08	5.1E-08

Attachment 2

Integrated Radioactive Waste Treatment System (IRTS) Evaporator Cleaning Project

Since May of 1988, when the Integrated Radwaste Treatment System (IRTS) began radioactive operations at the West Valley Demonstration Project (WVDP), it has been used to process approximately 400,000 gallons of liquid high level radioactive waste (HLW). The IRTS first removes radioactive cesium from the liquid using an ion exchange technique, concentrates this liquid by evaporation, then solidifies the resultant low level waste in cement, in drums suitable for long-term storage. As part of the overall process, water has been added to dilute the liquid in the HLW storage tank. Analyses of samples from the IRTS process and of the sludge at the bottom of the HLW tank indicates that the dilution is causing dissolution of fissile material out of the sludge into the liquid phase. Some of this fissile material is accumulating as scale in the IRTS evaporator, (equipment identification number 31017).

Beginning in June of 1991, West Valley Nuclear Services Co., Inc. (WVNS), chemically cleaned the evaporator with dilute nitric and boric acid to remove the accumulated scale. The resultant wash solution was then neutralized and returned to the HLW tank. Proposed system changes, such as pH adjustment of the HLW in the storage tank and the use of titanium-coated zeolite in the ion exchange process will be implimented to reduce the possibility of future scale in the evaporator.

Due to high radiation fields associated with the evaporator, and to avoid radioactive exposure to sampling personnel, scale samples were not collected from the evaporator. However, based on mass balance calculations, the scale is thought to contain complex sodium, potassium, uranium, and plutonium carbonates. Based on laboratory tests on treated supernatant samples, it was determined that these solids would be soluble in nitric acid. As the solids dissolve, the principal non-radioactive off-gas constituents will be carbon dioxide and possibly nitrogen oxides (NO_x), if any of the sodium nitrite has been occluded in the solids.

To clean the evaporator, it was filled with approximately 3,600 liters of nitric acid solution to cover all affected parts. A 1.0 to 2.0 molar nitric acid solution was required in order to have surplus acid in solution after all solids reacted. Using a more concentrated nitric acid solution did not affect the generation of NO_x. NO_x emissions are based on the amount of sodium nitrite present in the evaporator when the acid is added. The excess acid remained as HNO_3. The cleaning solution was mixed in a separate tank and transferred to evaporator 31017 at 30 °C, then warmed up to 100 °C and held at that temperature for approximately 24 hours. All condensate was returned to the evaporator. The solution was then transferred to another tank for sampling and neutralization prior to being transferred to the HLW tank. The sample analysis was used to verify removal of the scale material.

Calculations that were performed prior to commencement indicated that nitric acid released to the atmosphere during the operation would be less than 0.07 kg per day (0.15 lbs/day). This would amount to a concentration of approximately 23 ppb being emitted in the plant off-gas from stack 15F-1.

The amount of NO_x emitted was expected to be minor because the solids within the evaporator will have been leached twice with warm demineralized water prior to the addition of the nitric acid, and nitrites are soluble in water. If the solids contain sufficient nitrite salts to consume 20 percent of the nitric acid, over a four-hour period, (two hours of filling the evaporator and two hours of warm-up) the evolution of NO_x will be approximately 6.84 kilograms per hour (15 lbs/hr x 4 hr/duration = 60 lbs for the whole job).

An estimated 40 percent of the NO_x would be caught in the evaporator condenser and Vessel Off-Gas (VOG) scrubber and returned to the evaporator and the HLW tank. Thus, the net release over a four-hour period would be 16.4 kilograms (36.08 lbs ÷ 4 hrs = 9.02 lbs/hr), or a concentration of 36 ppm in the stack off-gas. Calculations have been provided.

Basis of Chemical Emissions

Basis of Calculations

Assuming the following:

- Cleaning of the evaporator will be performed with 1.0M HNO_3 (6.3 percent) which has a mole fraction of 0.0182;
- the mole fraction of vapor at boiling is 0.0023;
- vapor is condensed to liquid at boiling;
- saturated air at 32°C contains 3 weight percent H_2O vapor;
- the noncondensible gases from the condenser are saturated with H_2O vapor and this H_2O vapor is 0.0023 mole fraction HNO_3;
- non-condensible gases to VOG is 140 L/min (5 scfm).

$$\frac{140 \text{ L/min}}{22.4 \text{ L/gram-mole}} \times 0.029 \text{ kg/gram-mole} \times 60 \text{ min/hr} \times 0.03$$

= 0.326 Kg water vapor/hr

$$0.326 \text{ Kg/hr} \times \frac{63 \text{ mole wt of } HNO_3}{18 \text{ mole wt of } H_2O} \times 0.0023 \text{ mole fr @32°C} \times 24 \text{ hr/day}$$

= 0.063 Kg HNO_3 released/day

$$\text{Stack gas } 55{,}000 \text{ ft}^3\text{/min} \times 28.32 \text{ L/ft}^3 \times 1440 \text{ min/day} \times \frac{273 \times 10^{-6}}{293}$$

$$\times \frac{0.029 \text{ Kg/gram-mole}}{22.4 \text{ L/gram-mole}}$$

= 2.706 million Kg/day

$$\frac{0.063 \text{ Kg/day}}{2.706 \text{ million Kg/day}} = 0.023 \text{ ppm or } 23 \text{ ppb}$$

3600 L HNO_3 1.0 M = (3600 moles)(20%) = 720 moles to NO_x

Assuming half NO and half NO_2
Assuming 40% removed in condenser-VOG scrubber

720 gram-mole x 0.038 Kg/gram-mole = 27.36 Kg NO_x
27.36 Kg NO_x x 0.60 percent not removed in VOG
= 16.4 Kg released over four hours

$$\frac{16.4\ \text{Kg}}{4\ \text{hrs}}$$

= 4.1 Kg/hr released

Stack gas $\frac{2.706\ \text{million Kg/day}}{24\ \text{hrs/day}}$ = 0.113 million kg/hr

$\frac{4.1\ \text{Kg/hr}}{0.113\ \text{million Kg/hr}}$ = 36 ppm NOx in stack off-gas for four hours

Basis of NESHAP Evaluation

The attached calculations were performed to estimate potential doses to off-site residents due to airborne emissions from the Liquid Waste Treatment System (LWTS) Evaporator Acid Wash. The LWTS Evaporator Acid Wash was operational for approximately 3 weeks.

The amount of radioactivity released to the environment (source term) is estimated in Table 2-1 using the following assumptions:

- An emission (partition) factor of 1 (per Appendix D to 40 CFR 61 for liquid temperature > 100°C) was applied to the concentration in the liquid state to obtain the equivalent concentration in the vapor state. This is highly conservative; based on actual measurement of the concentration of radioactivity in the evaporator overheads, the partition factor is approximately 10,000.

- An adjustment factor of 0.03 was taken for the condenser associated with the Vessel Off-Gas System (VOG). This accounts for the condensation and return of water to the evaporator.

- An adjustment factor of 0.05 (per Appendix D to 40 CFR 61) was applied to this release for the scrubber in the VOG.

- An adjustment factor of 0.01 (per Appendix D to 40 CFR 61) was applied to this release for the HEPA filters (2 in series) in the ventilation system. These factors are more conservative than the recommended value (0.001 for the first) in the ANSI/N46.1 guidance for HEPA filters.

- Loss from the evaporator of 455 L/h (1000 lbs/h) was assumed during acid washing. The effective vapor release to the ventilation system was conservatively estimated to be 14 L/h due to the condenser.

The resulting source term for those radionuclides which contribute greater than 0.1% of the total committed effective dose equivalent (CEDE) was input to the AIRDOS-PC, version 3.0 code. The activity of ^{238}Pu was added to ^{239}Pu for the input. Four-year annual average (1987-1990) wind data from the on-site meteorology tower were input to the code. The resulting dose is estimated to be approximately 9×10^{-3} mrem/year to the maximally exposed off-site individual , located 1900 m NNW from the emission point. Actual emissions were monitored at the main plant exhaust per existing standard operating procedures.

Table 2-1

LWTS EVAPORATOR ACID WASH
Airborne Release Source Term Worksheet

ASSUMPTIONS AND DATA

Fission Products	40	Ci (assumed to be 100% Sr-90)
Mass U-235	1879	g
Mass U-238+U-234	105900	g (in equilibrium)
Mass Pu-239+Pu-241	460	g
Mass Total Pu	561	g
Liquid Volume	3600	L
Partition Factor	1	
Condenser DF	33	
Scrubber DF	20	
HEPA Filter DF	100	(2 in series)
Evaporative Loss	455	L/h
Hours of Operation	120	h

Radio-nuclide*	Ci/g	Mass%	Evaporator Activity Ci/L	Source Term Ci
Pu-238	1.70E+01	1.19%	3.15E-02	2.61E-04
Pu-239	6.10E-02	79.60%	7.57E-03	6.26E-05
Pu-241	1.00E+02	2.46%	3.83E-01	3.17E-03
Pu-240	2.30E-01	15.70%	5.63E-03	4.66E-05
Sr-90	N/A	N/A	1.11E-02	9.19E-05

* Those radionuclides which contribute greater than 0.1% of the total CEDE are listed.

40 CFR Part 61
National Emission Standards
for Hazardous Air Pollutants

CLEAN AIR ACT COMPLIANCE REPORT
(Version 3.0 November 1989)

Facility: West Valley Demonstration Project (DOE)
Address: P.O. Box 191
West Valley , NY. 14171-0191
Annual Assessment for Year: 1991
Date Submitted: 10/ 7/91

Comments: LWTS Evaporator Acid Wash

Prepared By:

Name: James J. Prowse, M.S.
Title: Project Health Physicist
Phone #: (716) 942-4270

Prepared for:
U.S. Environmental Protection Agency
Office of Radiation Programs
Washington, D.C. 20460

CLEAN AIR ACT COMPLIANCE REPORT 10/7/91 8:58 AM

Facility: West Valley Demonstration Project (DOE)
Address: P.O. Box 191 City: West Valley State: NY
Comments: LWTS Evaporator Acid Wash
Year: 1991

	Dose Equivalent Rates to Nearby Individuals (mrem/year)
Effective Dose Equivalent	0.0086
Highest Organ Dose is to ENDOSTEUM	0.1000

------------------------EMISSION INFORMATION------------------------

Radio-nuclide	Class	Amad	Stack MNPLNT (Ci/y)
PU-239	Y	1.0	3.2E-04
PU-241	Y	1.0	3.2E-03
PU-240	Y	1.0	4.7E-05
SR-90	D	1.0	9.2E-05
Y-90	Y	1.0	9.2E-05
Stack Height (m)			63.40
Stack Diameter (m)			1.35
Momentum (m/s)			18.3

-------------------------SITE INFORMATION-------------------------

Wind Data	AV4YR60M.WND	Temperature (C)	7
Food Source	LOCAL	Rainfall (cm/y)	104
Distance to Individuals (m)	1900	Lid Height (m)	1000

*NOTE: The results of this computer model are dose estimates. They are only to be used for the purpose of determining compliance and reporting per 40 CFR 61.93 and 40 CFR 61.94.

ORGAN DOSE TO THE MAXIMALLY EXPOSED INDIVIDUAL

ORGAN	DOSE EQUIVALENT RATE TO THE ORGAN (mrem/y)
GONADS	1.3E-03
BREAST	1.3E-04
RED MARROW	8.6E-03
LUNGS	2.3E-02
THYROID	1.3E-04
ENDOSTEUM	1.0E-01
REMAINDER	4.6E-03
EFFECTIVE	8.6E-03

DOSE TO THE MAXIMALLY EXPOSED INDIVIDUAL
BY PATHWAY FOR ALL RADIONUCLIDES

	EFFECTIVE DOSE EQUIVALENT (mrem/y)	DOSE EQUIVALENT TO THE ORGAN WITH THE HIGHEST DOSE ENDOSTEUM (mrem/y)
INGESTION	1.6E-03	2.8E-02
INHALATION	7.0E-03	7.5E-02
AIR IMMERSION	9.0E-13	8.4E-13
GROUND SURFACE	2.7E-07	9.7E-08
TOTAL:	8.6E-03	1.0E-01

DOSE TO THE MAXIMALLY EXPOSED INDIVIDUAL
BY RADIONUCLIDE FOR ALL PATHWAYS

RADIONUCLIDE	EFFECTIVE DOSE EQUIVALENT (mrem/y)	DOSE EQUIVALENT TO THE ORGAN WITH THE HIGHEST DOSE ENDOSTEUM (mrem/y)
PU-239	6.6E-03	7.6E-02
PU-241	1.0E-03	1.6E-02
PU-240	9.4E-04	1.1E-02
SR-90	4.1E-05	4.5E-04
Y-90	4.7E-08	2.5E-10
TOTAL :	8.6E-03	1.0E-01

EFFECTIVE DOSE EQUIVALENT AS A FUNCTION
OF DISTANCE IN THE DIRECTIONS OF THE
MAXIMALLY EXPOSED INDIVIDUAL FOR
ALL RADIONUCLIDES AND ALL PATHWAYS

DIRECTION : SOUTHEAST

DISTANCE (meters)	EFFECTIVE DOSE EQUIVALENT (mrem/y)
1900	8.6E-03
3000	5.7E-03
10000	1.4E-03
80000	7.7E-05

EFFECTIVE DOSE EQUIVALENT AS A FUNCTION
OF ALL DISTANCES AND ALL DIRECTIONS FOR ALL
RADIONUCLIDES AND ALL PATHWAYS

DIRECTIONS:	N	NNE	NE	ENE	E	ESE	SE	SSE
DISTANCE (METERS):								
1900	5.7E-03	3.9E-03	5.2E-03	6.5E-03	6.4E-03	7.9E-03	8.6E-03	4.8E-03
3000	4.5E-03	3.1E-03	4.0E-03	4.7E-03	4.6E-03	5.5E-03	5.7E-03	3.2E-03
10000	1.5E-03	9.4E-04	1.1E-03	1.3E-03	1.2E-03	1.4E-03	1.4E-03	7.8E-04
80000	9.9E-05	6.5E-05	7.7E-05	7.7E-05	6.6E-05	7.5E-05	7.7E-05	4.1E-05

	S	SSW	SW	WSW	W	WNW	NW	NNW
DISTANCE (METERS):								
1900	3.1E-03	2.1E-03	2.2E-03	1.7E-03	1.7E-03	2.0E-03	3.9E-03	8.7E-03
3000	2.1E-03	1.4E-03	1.6E-03	1.2E-03	1.2E-03	1.5E-03	3.0E-03	6.9E-03
10000	5.1E-04	3.5E-04	3.8E-04	3.0E-04	3.3E-04	3.9E-04	8.2E-04	2.3E-03
80000	2.5E-05	1.5E-05	1.6E-05	1.2E-05	1.4E-05	1.8E-05	4.0E-05	1.4E-04

Attachment 3

8D-2 Sludge Mobilization and Wash System Process

Introduction

The primary objective of the West Valley Demonstration Project (WVDP) is to solidify high-level radioactive waste (HLW) stored in underground tanks into a form suitable for transportation and disposal. The HLW was the result of reprocessing of spent nuclear fuels by a former site operator, Nuclear Fuel Services, Inc. (NFS). In July 1983, the U.S. Department of Energy (DOE) formally selected borosilicate glass as the waste form for disposal. The HLW consists of two different waste forms, an alkaline PUREX waste and an acidic THOREX waste.

The PUREX waste was the result of reprocessing uranium fuel. The waste was then neutralized with sodium hydroxide. The PUREX waste was discharged to underground storage tank 8D-2. Insoluble metal hydroxides precipitated to the bottom of tank 8D-2 and formed a sludge layer.

The THOREX was the result of the reprocessing of thorium fuel. THOREX is an acidic solution. The THOREX is contained in tank 8D-4. The THOREX is to be transferred to tank 8D-2, but will require neutralizing prior to transfer.

HLW treatment at the WVDP is accomplished by the Integrated Radwaste Treatment System (IRTS), which consists of the following subsystems: the Supernatant Treatment System (STS), Liquid Waste Treatment System (LWTS), Cement Solidification System (CSS), Sludge Mobilization and Wash System (SMWS), and Vitrification System (VS).

Preliminary steps of the IRTS process are directed toward reducing the volume to be vitrified. First, the supernatant is decanted from tank 8D-2 and directed through a series of zeolite-containing columns in tank 8D-1, providing an ion exchange treatment that removes the majority of radioactive cesium. This operation is referred to as the STS. After the zeolite becomes loaded with cesium, it is discharged to the floor of tank 8D-1. The treated supernatant is then transferred to the LWTS, where it is filtered and concentrated by evaporation, and then to the CSS, where it is transformed into a cement matrix. After the supernatant has been decanted from tank 8D-2, the sludge will be washed several times with water to remove interstitial salts. Following the washing, the sludge will be allowed to resettle and the resulting supernatant will also be decanted and treated in the STS, LWTS, and CSS. After the supernatant resulting from the sludge washing is decanted, the cesium-loaded zeolite in tank 8D-1 and the THOREX in tank 8D-4 will be transferred to tank 8D-2 and mixed with the sludge. The homogenized mixture will then be transferred to the Vitrification Facility (VF) where it will be transformed into borosilicate glass.

Sludge Mobilization and Wash System Overview

WVDP has completed the first operational phase of the IRTS process outlined above, namely, treatment and solidification of the initial supernatant. Efforts are currently underway to begin the next phase, referred to as the sludge mobilization and washing system.

The SMWS will mix the sludge using mobilization pumps. The interstitial salts and salt crystals will be dissolved by the addition of dilute sodium hydroxide solution. This suppresses actinide solubility. It is necessary to remove the salts due to their adverse effect on the production of borosilicate glass.

Once the sodium hydroxide is added, a series of five centrifugal pumps are used to agitate the tank contents and resuspend the settled solids. The exact duration of mixing will be determined by sampling the mixture periodically and tracking the change in solution salt concentration. After the salt concentration has stabilized, the mixing will be discontinued and the solids will be allowed to resettle.

The SMWS processes will wash soluble salts from the HLW sludge waste in Tank 8D-2 and the STS will treat the wash solutions such that the effluent wash water can be concentrated in the LWTS and made into a cemented waste form in the CSS facility.

A total of four wash cycles over the next two years has tentatively been planned to wash the sludge adequately. It is anticipated that during the four cycles approximately 15,000 gallons of sodium hydroxide will be added to tank 8D-2. If indicated, additional wash cycles will be performed or the quantities of wash solution and caustic will be adjusted to meet the end goal.

Potential Air Emissions

It is planned to pump a sodium hydroxide solution (20-50%) into tank 8D-2 at a rate of less than 50 gallons per minute. The tank solution pH is already basic, so that this addition will result in a rise in pH and will not result in any significant chemical reaction.

The vapor pressure of sodium hydroxide is extremely low (1×10^{-5}*mm Hg). Hence, no measurable releases are possible from volatilization. There may be local splashing from the addition of the sodium hydroxide into the tank; however, due to the large tank air space, the large droplets would not be carried out in the ventilation system. Hence, there would be no environmental release from this operation from either a chemical reaction or mechanical means.

---

*From the International Critical Tables

Basis of NESHAP Evaluation

The attached calculations were performed to estimate potential doses to off-site residents due to airborne emissions from the 8D-2 Sludge Mobilization and Wash System (SMWS) Process.

The amount of radioactivity released to the environment (source term) is estimated in Table 3-1 using the following assumptions:

- Radioactive inventory derived from the Safety Analysis Report for the Supernatant Treatment System, Rev. 6.
- An adjustment factor of 0.03 was taken for the condenser associated with the Waste Tank Farm Ventilation System (WTFVS). This accounts for the condensation and return of water to tank 8D-2.
- An emission (partition) factor of 1,000 (per Appendix D to 40 CFR 61) was applied to the concentration in the liquid state to obtain the equivalent concentration in the vapor state.
- An adjustment factor of 0.01 (per Appendix D to 40 CFR 61) was applied to this release for the HEPA filter in the ventilation system. This factor is more conservative than the recommended value (0.001) in the ANSI/N46.1 guidance for HEPA filters.
- Loss from tank 8D-2 of 1,000 L/h was assumed during SMWS operation. The effective vapor release to the ventilation system was conservatively estimated to be 33 L/h due to the condenser.

The resulting source term was input to the AIRDOS-PC, version 3.0 code. The activity of ^{238}Pu was added to ^{239}Pu for the input. Four-year annual average (1987-1990) wind data from the on-site meteorology tower were input to the code. The resulting dose is estimated to be 6×10^{-2} mrem/year to the maximally exposed off-site individual, located 1900 m NNW from the emission point. Actual emissions will be monitored at the main plant exhaust per existing standard operating procedures.

Table 3-1 - SMWS Source Term

Nuclide	Retention Class	First Wash Conc. (no dilution) Ci/L	* Second Wash Conc. Ci/L	* Third Wash Conc. Ci/L	* Fourth Wash Conc. Ci/L	WTFVS Effluent Ci/y
H-3	WATER	2.51E-05	6.56E-06	1.72E-06	4.48E-07	1.22E+00
H-3	ELEMENTAL	2.17E-45	5.67E-46	1.48E-46	3.88E-47	1.05E-40
C-14	ORGANIC	4.43E-05	1 16E-05	3.03E-06	7.91E-07	2.15E+00
C-14	CO2	2.17E-45	5.67E-46	1.48E-46	3.88E-47	1.05E-40
Fe-55	D	3.84E-08	1.00E-08	2.62E-09	6.86E-10	6.21E-10
Co-60	Y	3.99E-06	1.04E-06	2.72E-07	7.12E-08	6.45E-08
Ni-63	D	2.76E-04	7.22E-05	1.89E-05	4.93E-06	4.47E-06
Sr-90+	Y	1.13E-03	2.95E-04	7.71E-05	2.02E-05	1.83E-05
Tc-99	W	5.13E-04	1.34E-04	3.50E-05	9.15E-06	8.29E-06
Ru-106	Y	2.81E-07	7.34E-08	1.92E-08	5.01E-09	4.54E-09
Sb-125	W	7.24E-05	1.89E-05	4.95E-06	1.29E-06	1.17E-06
Te-125m	W	1.62E-05	4.25E-06	1.11E-06	2.90E-07	2.63E-07
I-129	D	6.80E-08	1.78E-08	4.64E-09	1.21E-09	3.30E-03
Cs-134	D	8.18E-04	2.14E-04	5.59E-05	1.46E-05	1.32E-05
Cs-137+	D	1.64E+00	4.28E-01	1.12E-01	2.93E-02	2.65E-02
Pm-147	Y	2.36E-05	6.18E-06	1.61E-06	4.22E-07	3.82E-07
Sm-151	W	4.58E-07	1.20E-07	3.13E-08	8.18E-09	7.41E-09
Eu-154	W	4.14E-06	1.08E-06	2.83E-07	7.39E-08	6.69E-08
Eu-155	W	5.61E-07	1.47E-07	3.84E-08	1.00E-08	9.08E-09
U-233	Y	1.92E-06	5.02E-07	1.31E-07	3.43E-08	3.11E-08
U-234	Y	1.15E-06	3.01E-07	7.87E-08	2.06E-08	1.86E-08
U-235	Y	2.51E-08	6.56E-09	1.72E-09	4.48E-10	4.06E-10
U-238	Y	2.36E-07	6.18E-08	1.61E-08	4.22E-09	3.82E-09
Pu-238	W	4.96E-04	1.30E-04	3.39E-05	8.86E-06	8.03E-06
Pu-239	W	9.60E-05	2.51E-05	6.56E-06	1.71E-06	1.55E-06
Pu-240	W	7.24E-05	1.89E-05	4.95E-06	1.29E-06	1.17E-06
Pu-241	W	4.72E-03	1.23E-03	3.22E-04	8.42E-05	7.63E-05
Am-241	W	1.03E-05	2.70E-06	7.06E-07	1.85E-07	1.67E-07
Am-243	W	7.39E-07	1.93E-07	5.05E-08	1.32E-08	1.19E-08
Cm-244	W	2.95E-06	7.72E-07	2.02E-07	5.28E-08	4.78E-08

* Follows simple dilution

40 CFR Part 61
National Emission Standards
for Hazardous Air Pollutants

CLEAN AIR ACT COMPLIANCE REPORT
(Version 3.0 November 1989)

Facility: West Valley Demonstration Project (DOE)
Address: P.O. Box 191
West Valley , NY. 14171-0191
Annual Assessment for Year: 1991
Date Submitted: 10/ 7/91

Comments: 8D-2 Sludge Mobilization and Wash System

Prepared By:

Name: James J. Prowse, M.S.
Title: Project Health Physicist
Phone #: (716) 942-4270

Prepared for:
U.S. Environmental Protection Agency
Office of Radiation Programs
Washington, D.C. 20460

Facility: West Valley Demonstration Project (DOE)
Address: P.O. Box 191 City: West Valley State: NY
Comments: 8D-2 Sludge Mobilization and Wash System
Year: 1991

	Dose Equivalent Rates to Nearby Individuals (mrem/year)
Effective Dose Equivalent	0.0640
Highest Organ Dose is to THYROID	0.8800

---EMISSION INFORMATION---

Radionuclide	Class	Amad	Stack MNPLNT (Ci/y)
H-3	*	0.0	1.2E+00
C-14	*	0.0	2.2E+00
CO-60	Y	1.0	6.5E-08
SR-90	D	1.0	1.8E-05
Y-90	Y	1.0	1.8E-05
I-129	D	1.0	3.3E-03
CS-137	D	1.0	2.6E-02
U-234	Y	1.0	1.9E-08
U-235	Y	1.0	4.1E-10
U-238	Y	1.0	3.8E-09
PU-239	Y	1.0	9.5E-06
PU-240	Y	1.0	1.2E-06
PU-241	Y	1.0	7.6E-05
AM-241	W	1.0	1.7E-07
BA-137M	D	1.0	0.0E-01
Stack Height (m)			63.40
Stack Diameter (m)			1.35
Momentum (m/s)			18.3

---SITE INFORMATION---

Wind Data	AV4YR60M.WND	Temperature (C)	7
Food Source	LOCAL	Rainfall (cm/y)	104
Distance to Individuals (m)	1900	Lid Height (m)	1000

*NOTE: The results of this computer model are dose estimates. They are only to be used for the purpose of determining compliance and reporting per 40 CFR 61.93 and 40 CFR 61.94.

JEP0261

ORGAN DOSE TO THE MAXIMALLY EXPOSED INDIVIDUAL

ORGAN	DOSE EQUIVALENT RATE TO THE ORGAN (mrem/y)
GONADS	4.0E-02
BREAST	4.2E-02
RED MARROW	3.9E-02
LUNGS	3.3E-02
THYROID	8.8E-01
ENDOSTEUM	5.3E-02
REMAINDER	3.5E-02
EFFECTIVE	6.4E-02

DOSE TO THE MAXIMALLY EXPOSED INDIVIDUAL
BY PATHWAY FOR ALL RADIONUCLIDES

	EFFECTIVE DOSE EQUIVALENT (mrem/y)	DOSE EQUIVALENT TO THE ORGAN WITH THE HIGHEST DOSE THYROID (mrem/y)
INGESTION	3.7E-02	8.5E-01
INHALATION	2.3E-04	7.9E-04
AIR IMMERSION	6.6E-10	6.7E-10
GROUND SURFACE	2.6E-02	2.9E-02
TOTAL:	6.4E-02	8.8E-01

DOSE TO THE MAXIMALLY EXPOSED INDIVIDUAL BY RADIONUCLIDE FOR ALL PATHWAYS

RADIONUCLIDE	EFFECTIVE DOSE EQUIVALENT (mrem/y)	DOSE EQUIVALENT TO THE ORGAN WITH THE HIGHEST DOSE THYROID (mrem/y)
H-3	4.7E-05	4.3E-05
C-14	4.6E-03	2.4E-03
CO-60	7.4E-08	8.1E-08
SR-90	1.4E-05	5.7E-07
Y-90	8.7E-09	1.6E-12
I-129	2.6E-02	8.5E-01
CS-137	7.4E-03	8.1E-03
U-234	1.3E-07	1.2E-09
U-235	2.9E-09	2.5E-10
U-238	2.4E-08	2.2E-10
PU-239	1.9E-04	3.0E-06
PU-240	2.4E-05	3.7E-07
PU-241	2.6E-05	5.5E-07
AM-241	4.8E-06	1.2E-07
BA-137M	2.5E-02	2.8E-02
TOTAL :	6.4E-02	8.8E-01

EFFECTIVE DOSE EQUIVALENT AS A FUNCTION OF DISTANCE IN THE DIRECTIONS OF THE MAXIMALLY EXPOSED INDIVIDUAL FOR ALL RADIONUCLIDES AND ALL PATHWAYS

DIRECTION : NORTH-NORTHWEST

DISTANCE (meters)	EFFECTIVE DOSE EQUIVALENT (mrem/y)
1900	6.4E-02
3000	4.6E-02
10000	1.2E-02
80000	6.4E-04

EFFECTIVE DOSE EQUIVALENT AS A FUNCTION
OF ALL DISTANCES AND ALL DIRECTIONS FOR ALL
RADIONUCLIDES AND ALL PATHWAYS

DIRECTIONS: DISTANCE (METERS):	N	NNE	NE	ENE	E	ESE	SE	SSE
1900	4.0E-02	2.6E-02	3.3E-02	4.1E-02	3.9E-02	4.8E-02	5.2E-02	2.9E-02
3000	2.9E-02	1.9E-02	2.4E-02	2.8E-02	2.7E-02	3.2E-02	3.3E-02	1.9E-02
10000	7.8E-03	4.9E-03	5.9E-03	6.5E-03	5.9E-03	6.9E-03	7.1E-03	3.9E-03
80000	4.0E-04	2.5E-04	3.0E-04	3.1E-04	2.7E-04	3.2E-04	3.5E-04	1.9E-04

DISTANCE (METERS):	S	SSW	SW	WSW	W	WNW	NW	NNW
1900	1.9E-02	1.3E-02	1.4E-02	1.0E-02	1.0E-02	1.3E-02	2.5E-02	6.4E-02
3000	1.2E-02	8.3E-03	9.0E-03	6.9E-03	7.2E-03	8.6E-03	1.7E-02	4.6E-02
10000	2.5E-03	1.6E-03	1.8E-03	1.3E-03	1.5E-03	1.8E-03	3.8E-03	1.2E-02
80000	1.1E-04	7.2E-05	7.9E-05	5.8E-05	6.4E-05	7.9E-05	1.7E-04	6.4E-04

DW:87:0477

ALEXANDER
DUKER
GESSNER
GREENQUIST
HOFFMAN
HUMPHREY
KNABENSCHUH
KRAUSS
LAWRENCE
MARCHETTI
SGROI
SWENSON
ROGERS

NOV 12 1987

West Valley Project Office
Idaho Operations Office
P.O. Box 191
West Valley, NY 14171

RECEIVED
NOV 16 1987

November 10, 1987

U. S. Environmental Protection Agency
Director, Air and Waste Management
Attention: Regional Radiation Representative
2 AWM
26 Federal Plaza
New York, New York 10278

SUBJECT: Notification of Startup of Radioactive Air Source WVDP-387-01 at the WVDP, West Valley, N. Y.

Dear Sir:

As requested by 40 CFR 61.09 (a) (2), you are hereby notified that the Supernatant Treatment Ventilation System identified in the subject approval to construct /modify was started up on October 30, 1987.

Sincerely,

W. W. Bixby

W. W. Bixby, Director
West Valley Project Office

cc: J. P. Hamric, DOE-ID
J. H. Barry, DOE-ID
S. Meyers, EPA
M. L. Walker, EH-1
J. L. Knabenschuh, WVNS

TGA:270:87 - 0308:87:10

TGA:tl

WD:87:0686

November 2, 1987

Dr. W. W. Bixby, Director
West Valley Project Office
U. S. Department of Energy
P. O. Box 191
West Valley, New York 14171-0191

Dear Dr. Bixby:

SUBJECT: Notification of Startup of Radioactive Air Source WVDP-387-01 at the West Valley Demonstration Project, West Valley, NY

As required by 40 CFR 61.09(a)(2) you are hereby notified that the Supernatant Treatment Ventilation System identified in the subject approval to construct/modify was started up on October 30, 1987.

This notification should be forwarded no later than November 14, 1987 to:

U.S. Environmental Protection Agency
Director, Air & Waste Management Division
Attn: Regional Radiation Representative
2 AWM
26 Federal Plaza
New York, NY 10278

Very truly yours,

C. J. Roberts, Manager
Safety and Environmental Assessment
West Valley Nuclear Services Co., Inc.

HE:87:0165

JPE:rlc

cc: T. G. Adams, DOE/WVPO

RLC3029:SEA-80

October 8, 1987

Mr. J. E. Krauss, President
West Valley Nuclear Services Co., Inc.
P. O. Box 191
West Valley, New York 14171

SUBJECT: Interim NESHAPS Approvals To Construct/Modify Sources of Radionuclide Emissions at the West Valley Demonstration Project

Dear Sir:

Enclosed are the interim approvals from U. S. Environmental Protection Agency, Region II to construct/modify the following sources of radionuclide emissions at the WVDP:

WVDP - 187-01	Building 01-14 Ventilation System
WVDP - 287-01	Contact Size Reduction & Decontamination Facility Ventilation System
WVDP - 387-01	Supernatant Treatment Ventilation System
WVDP - 487-01	Low-Level Waste Supercompactor Ventilation System

Final approval will be issued once the WVDP dose equivalent estimates have been confirmed by the EPA through an independent computer run of the EPA Radiation computer code AIRDOS-EPA.

With the receipt of the above mentioned approvals and in compliance with the terms and conditions of these approvals, you are hereby authorized to proceed with the startup of the subject System.

Sincerely,

WWB

W. W. Bixby, Director
West Valley Project Office

Enclosures

TGA:234:87 - 0373:87:09

TGA:~~tp~~

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
290 BROADWAY
NEW YORK, NY 10007-1866

file Barbara Elizabeth

MAY 1998
Received
DOE-WV

MAY - 4 1998

Mr. T.J. Rowland
Director, West Valley Project Office
U.S. Department of Energy
MS-DOE
10282 Rock Springs Road
P.O. Box 191
West Valley, New York 14171

Dear Mr. Rowland:

In accordance with the provisions of the Clean Air Act, as amended (42 U.S.C. 7401 et seq.), the U.S. Environmental Protection Agency (EPA) has reviewed your applications to modify permit WVDP#387-01 - Supernatant Treatment System Permanent Ventilation System (STS/PVS). This permit was originally issued on October 5, 1987.

Pursuant to Title 40, Code of Federal Regulations, Part 61, Subpart H, National Emission Standards for Radionuclide Emissions from Department of Energy Facilities, approval of your application is granted. This approval is granted based upon a technical review of submissions received by EPA on February 20, 1998 for the above location. This approval specifically allows for Tanks 8D-1 and 8D-2 to be vented on all occasions through the STS/PVS.

If you have any questions regarding this approval, please contact Paul A. Giardina, Radiation & Indoor Air Branch Chief, at (212) 637-4010.

Sincerely,

Jeanne M. Fox

Jeanne M. Fox
Regional Administrator

cc: John P. Cahill
Commissioner
New York State Department of Environmental Conservation

Barbara A. DeBuono
Commissioner
New York State Department of Health

57481

Recd.
Rec. Mgmt.
February 13, 1998

Department of Energy
Ohio Field Office
West Valley Area Office
P.O. Box 191
West Valley, NY 14171

DW:98:0103

February 12,1998

Mr. George Brozowski
Regional Radiation and Indoor Air Representative
Region II
United States Environmental Protection Agency
26 Federal Plaza
New York, NY 10278

SUBJECT: Request for Approval to Modify Permit WVDP 387-01 for the Supernatant Treatment System Permanent Ventilation System

Dear Mr. Brozowski:

Enclosed please find the West Valley Demonstration Project (WVDP) Request for Approval to Modify Permit WVDP 387-01 for the Supernatant Treatment System Permanent Ventilation System (STS/PVS) and supporting calculations. This request to modify our permit is being submitted pursuant to the telephone conversation between you and members of my staff. The WVDP would like to adjust our operating procedures to allow for continuous ventilation of the Waste Tank Farm by use of the STS/PVS. Currently, the STS/PVS permit description allows for occasional use for ventilation of Tanks 8D-1 and 8D-2 to provide additional air flow in the Waste Tank Farm. Routine ventilation of these tanks is through the Waste Tank Farm Ventilation System (WTFVS) which is exhausted through the main plant stack (permit WVDP 687-01).

The WVDP Vitrification Operations has been encountering lower performance efficiencies with the 30-year old WTFVS and is evaluating the conversion of the system so that all tanks (8D-1, 8D-2, and the smaller 8D-3 and 8D-4) could be ventilated through the STS/PVS on a routine basis as needed. Continuous, routine use of the STS/PVS to ventilate these tanks would represent a change to the existing system description and a higher potential Estimated Dose Equivalent (EDE) to the Maximally Exposed Off-Site Individual (MEOSI) than originally was determined in the 1987 National Emission Standard for Hazardous Air Pollutants (NESHAP) permit. Calculations using Appendix D of 40 CFR 61 Subpart H result in an EDE to MEOSI over 1 percent of the 10 millirem per year standard warranting a permit modification.

If you have any questions regarding this request to modify our permit, please contact Moira Maloney of my staff at (716) 942-4255.

Sincerely,

for

T. J. Rowland, Director
West Valley Demonstration Project

Enclosures: 1. Request for Approval to Modify Sources of Atmospheric Emissions of Radionuclides

2. Attachment A: Source Term Development

3. Attachment B: Dose Assessment CAP88-PC

cc: S. G. Schneider, WVNS, AOC-24, w/enc.

MNM:045 - 54399 - 454.2.2

MNM/jas

Request for Approval to Modify
Sources of Atmospheric Emissions of Radionuclides

I. Name and Address of Applicant

U. S. Department of Energy
West Valley Demonstration Project
10282 Rock Springs Road
P.O. Box 191
West Valley, NY 13171-0191

Operating Contractor

West Valley Nuclear Services Co, Inc.
10282 Rock Springs Road
P.O. Box 191
West Valley, NY 13171-0191

II. Name and Location of the Source

Name:	Supernatant Treatment System Permanent Ventilation System (STS/PVS)
Location:	West Valley Demonstration Project 10282 Rock Springs Road West Valley, NY 13171-0191
Latitude:	42 degrees 27 minutes N
Longitude:	78 degrees 39 minutes W

Date of Start up:	October 30, 1997
Estimated date of modification:	Winter/Spring 1999

III. Release Point Information

Emission Point ID:	STSHV
Ground Elevation (Ft above MSL):	1407'
Stack Height (Ft.):	33'
Height above Structure (Ft.):	18'
Inside Dimensions (inches):	15.5"
Exit Temperature:	100 degrees
Exit Velocity (ft/sec):	41 ft/sec
Exit Volume: (ACFM):	4500 ACFM

IV. Technical Information About Source

A. Overview of Operation Modifications

The Supernatant Treatment System (STS) was designed to concentrate the radioactivity (primarily Cs-137) in the liquid phase of the PUREX high level radioactive waste previously stored in underground storage tank 8D-2. The concentrated activity was blended with the remaining high level waste, which is currently being fed through the Vitrification process, and the cesium-stripped supernatant was processed into a low level waste cement that was contained in 71-gallon steel drums which are stored in an on-site aboveground vault, the drum cell.

The Permanent Ventilation System (PVS) was originally designed for the ventilation of the STS and occasional augmentation of the waste tank farm ventilation system. The current waste tank farm ventilation system vents tanks 8D-1, 8D-2, 8D-3, and 8D-4 through the main stack. The STS/PVS system will be configured to provide continuous ventilation of these tanks on an as needed basis. Either system may be used for continuous ventilation of the tanks.

B. Source Term Development

The source term for operation of the STS/PVS system for primary waste tank farm ventilation is based on continuous operation of the ventilation system for the STS building and continuous ventilation of the high level waste tanks. Attachment A describes the source term development and assumptions used to calculate the potential Estimated Dose Equivalent (EDE) to the Maximally Exposed Off Site Individual (MEOSI).

C. Dose Assessment

The EDE to the MEOSI was calculated using CAP88-PC modeling and the Dose Assessment and Summary are included as Attachment B.

ATTACHMENT A: SOURCE TERM DEVELOPMENT

OBJECTIVE: Calculate the radionuclide release rate from STS PVS, when ventilating the WTF in support of vitrification operations.

ASSUMPTIONS:

Radioactive inventory in the WTF in 1996 is as given in WVDP-186, WQR-1.2, Rev. 1, "WVDP Waste Form Qualification Report - Canistered Waste Form Specifications. Radionuclide Inventory Specification," 8/13/96.

Decay and ingrowth of radioactive inventory between 1996 and 1998 is calculated using equations of WVNS-CAL-109, Rev. 0. "Reference Insoluble Waste and Decay Calculations for WQR Section 1.2," 12/20/94.

The only other radionuclides in solution than those routinely measured during WTF operations are 129-I, 79-Se, and 99-Tc, which were found only in supernatant during waste characterization.

There were no insoluble species in Tank 8D-1.

No radionuclides were removed from the WTF during IRTS or other treatment.

Radionuclides have been removed from the WTF and transferred to the VF. For those radionuclides specifically measured during VF operations, the measured amount was used. All radionuclides not specifically measured during vitrification processing are assumed to have been removed from the WTF in the same ratio as iron, which has been measured to have one of the lowest removal efficiencies based on VF measurements.

DF estimates based on ANSI standards.

Evaporation rates are based on saturated air at plenum conditions.

Tank plenum pressures are 14.2 psia.

There is negligible source from Tanks 8D-3 and 8D-4.

The ventilation flow rates from Tanks 8D-1 and 8D-2 are 250 scfm each.

Radioactive Inventory

The radioactive inventory of reference 1 was adjusted for decay and ingrowth per reference 2 equations. The calculations were made using a Lotus 4.0 spreadsheet, attached to this calculation.

The inventory is conservatively high since it does not account for losses during IRTS pretreatment operations. Significant radionuclides are currently in the Drum Cell as part of the cement waste form.

The inventory was reduced according to the measured amounts made into glass. For those radionuclides not specifically measured during VF operations, the removal fraction was assumed to be the same as for iron: iron has been one of elements measured to have the least efficient removal rate.

Soluble Concentration

Current estimates of the soluble concentrations are based on sample measurements from Tanks 8D-1 and 8D-2. Samples from Tank 8D-1 are collected each month. Samples from Tank 8D-2 are taken during each transfer of liquid from Tank 8D-2 to Tank 8D-1. The most recent six samples of each were assumed to be typical. The values are shown on the attached Lotus spreadsheet. The median value was the value for all analyses greater than zero. The single detectable value for "gross alpha" from Tank 8D-1 was assumed to be Tank 8D-1's median value. The median values are seen to be conservative for Tank 8D-2 in that the concentrations are decreasing with time due to vitrification processing.

Concentration of 90-Sr was estimated based on the distribution coefficient measured with the initial PUREX waste in Tank 8D-2. There was initially 2956 Ci of 90-Sr in the supernatant and 6.9 E+6 Ci in the sludge. For the 90-Sr remaining in the tank (1.95 E+6 remains after decay and glass production), the liquid component remaining = 835 Ci.

$$90\text{-}Sr_{soluble} = 1.95 \times 10^6 \times \frac{2956}{6.9 \times 10^6}$$

With 274,000 liter of fluid in Tank 8D-2, the 90-Sr concentration is 3.05 E-3 Ci/liter. The 90-Sr concentration is Tank 8D-1 was assumed to be 1% of the value in Tank 8D-2.

90-Y and 137m-Ba concentrations were calculated from the 90-Sr and 137-Cs concentrations, respectively, as short lived daughters.

134-Cs and 135-Cs concentrations were ratio-ed to the 137-Cs concentration according to their respective isotopic ratios in the radioactive inventory of waste calculated above. Letting "i" be either 134 or 135;

$$(i\text{-}Cs) = (137\text{-}Cs) \times \frac{M_{i\text{-}Cs}}{M_{137\text{-}Cs}}$$

Uranium isotope concentrations were calculated by first calculating the total mass of uranium in the waste based on the radioactive inventory above. Letting "i" be any of the uranium isotopes and "K" being a constant to adjust from curies to grams.

$$i\text{-}U = K \times \frac{t_{1/2,i}}{A.W._i}$$

The ratio of each isotope to the total mass, Ci/g, was then calculated. These ratios were then multiplied by the measured soluble uranium concentration, in μg/g, to calculate the isotopic concentration.

Plutonium isotope concentrations were calculated using the ratios of their respective isotopic ratios in the radioactive inventory calculated above. The isotopes not measured were calculated by ratio to the three plutonium measurements. The average of the three ratios was the value used in the table. Letting "i" be 236, 239, 240, 241 or 242;

$$(i\text{-}Pu) = [(total\text{-}Pu) \times \frac{M_{i\text{-}Pu}}{M_{total\text{-}Pu}} + (238\text{-}Pu) \times \frac{M_{i\text{-}Pu}}{M_{238\text{-}Pu}} + (239{,}240\text{-}Pu) \times \frac{M_{i\text{-}Pu}}{M_{239,240\text{-}Pu}}] / 3$$

The "total Pu" of the radioactive inventory was calculated as the sum of all alpha-emitting plutonium isotopes, since that is the basis of the analytical measurement.

The only other radionuclides in solution than those routinely measured during WTF operations are 129-I, 79-Se, and 99-Tc, which were found only in supernatant during waste characterization.

Insoluble Concentration

There was assumed to be no insoluble inventory in Tank 8D-1.

$$(i\text{-}X_{insoluble}) = [M\text{-}i,total - (i\text{-}X_{meas,8D\text{-}1}) \times V_{8D\text{-}1} - (i\text{-}X_{meas,8D\text{-}2}) \times V_{8D\text{-}2}] / V_{8D\text{-}2}$$

Three steps were required to calculate the insoluble concentrations in Tank 8D-2. The total soluble inventory in Tank 8D-1 was calculated by multiplying the volume in Tank 8D-1 by each measured concentration. The same was done for Tank 8D-2's soluble inventory. The sum of the two tanks' soluble inventories was subtracted from the total radioactive inventory calculated above, and the net was divided by the fluid volume in Tank 8D-2.

There was assumed to be no insoluble concentration in Tank 8D-2 except when the mobilization pumps are operating. This is based on observation that slurry samples quickly settle to the bottom of a clear supernatant layer when agitation stops. As such, there is no reasonable possibility that they can be entrained into the ventilation flow.

Evaporation and Entrainment into Ventilation Flow

The DF for evaporation and entrainment was assumed to be 100 for insoluble species and 1,000 for soluble species (ANSI N46.1-1980).

$$\frac{\partial}{\partial t} M_{i-X} = (i-X) \ x \ \frac{1}{DF_i} \ x \ \frac{\partial}{\partial t} M_{water}$$

The DF relates concentration of species. The rate of radionuclide transfer into the ventilation flow is the supernatant concentration multiplied by the DF for the species, multiplied by the water evaporation rate.

Water evaporation rate was calculated assuming ventilation flows leaving the tank are saturated at the plenum temperature conditions. Tank pressures were assumed to be 14.2 psia, which is typical for site conditions at 5 in. w.c. (neg.). Temperatures were based on the observed temperatures. Flow rate was assumed to be 250 scfm from each tank. This is conservative since the combined measured WTF flow rate has been approximately 370 scfm. Partial pressure of water was based on a Henry's Law correlation to the steam tables.

Soluble radionuclides were assumed to enter the ventilation flow continually during the year. The insoluble radionuclides were assumed to enter the ventilation flow at the rate calculated for the soluble species (except the DF was 100 rather than 1,000), but for only the hours per year the mobilization pumps are operated.

Radionuclide Annual Release Rate

The amount of each radionuclide entering the ventilation flow was reduced by the PVS DF of 1 E+5 (ANSI N46.1-1980) to calculate the annual release rate. 129-I was assumed to have DF = 1 in the PVS. For conservative reasons and to account for maximum operational flexiblity, the release rates are calculated assuming continuous pump operation.

Past Measurements of Stack Release

The estimates were compared to prior experience with stack releases. The 1995 and 1996 (prior to vitrification operations) releases from the Main Plant stack are listed. The 1995 releases are from the Air Emissions Annual Report. The 1996 are from quarterly data. These were reduced by a DF = 100 to account for the difference in allowable treatments for the WTFVS and the PVS. 129-I was not corrected. In addition, an estimate of releases during 1997 when feed was terminated to the Melter was calculated. The release rate for 129-I when not feeding was approximately 6.3 E-8 Ci/hr. This was increased to an annual rate for the table.

REFERENCES:

1 WVNS-CAL266, Rev 0, "Radionuclide Release Rate From STS/PVS When Ventilating the WTF," 1/22/98

2 WVDP-186, WQR-1.2, Rev. 1, "WVDP Waste Form Qualification Report - Canistered Waste Form Specifications, Radionuclide Inventory Specification," 8/13/96.

3. WVNS-CAL-109, Rev. 0, "Reference Insoluble Waste and Decay Calculations for WQR Section 1.2," 12/20/94.

4. ANSI N46.1-1980, "Guidance for Defining Safety-related Features of Nuclear Fuel Cycle Facilities," 1981.

5. Letter DW:96:0532, "WVDP Air Emissions Annual Report for CY-1995, Per the NESHAP," T. J. Rowland to P. A. Giardina, 6/27/96.

PVS Release Rate

median of six most recent analyses

	U	alpha	beta	Pu	Pu-236	Pu-239,2	Cs-137	Sr-90
	ug/ml	uCi/ml	uCi/ml	uCi/ml	uCi/ml	uCi/ml	uCi/ml	uCi/ml
tank 8D1	4.30E+01	8.3E-03	6.8E+01	2.5E-04	1.6E-04	6.0E-05	4.63E+01	3.1E-05
tank 8D2	9.96E+01	0.0E+00	4.9E+01	1.2E-03	8.8E-04	3.4E-04	4.95E+01	3.1E-03

Mob Pump	on	off
hr/yr =	8766	8.77E+03

V,8D-1,l=	274000
V,8D-2,l=	274000

Plenum Temp, F =	8.00E+01	1.00E+02
P,H2O, psia =	5.00E-01	9.30E-01
Air Sweep, scfm =	2.50E+02	2.50E+02
Evap, ml/hr =	1.20E+04	2.24E+04

DF	
TDS evap	1.00E+02
TSS evap	1.00E+03
PVS	1.00E+05

Prior Removal

IRTS = 0 VF = 57.6 (Fe2O3 basis)

Radionuclide	Estimated Total Inventory						Analyses				Evaporation Source				Calculate
							Soluble		Insoluble		DF		Evap	DF	Released
	Initial Inventory		IRTS Removal, %	VF Removal, %	Net		Tank8D1	Tank 8D2	Tank 8D2		TDS	TSS	uCi/yr	PVS	uCi/yr
3-H	5.25E+01	Ci	0	57.6	2.22E+01	Ci			8.12E-02	uCi/ml	1	1	1.59E+07	1	1.59E+07
14-C	1.37E+02	Ci	0	57.6	5.81E+01	Ci			2.12E-01	uCi/ml	100	1000	4.16E+04	1E+05	4.16E-01
55-Fe	8.33E+01	Ci	0	57.6	3.53E+01	Ci			1.29E-01	uCi/ml	100	1000	2.53E+04	1E+05	2.53E-01
60-Co	2.68E+02	Ci	0	57.6	1.14E+02	Ci			4.15E-01	uCi/ml	100	1000	8.15E+04	1E+05	8.15E-01
59-Ni	1.06E+02	Ci	0	57.6	4.49E+01	Ci			1.64E-01	uCi/ml	100	1000	3.22E+04	1E+05	3.22E-01
63-Ni	8.05E+03	Ci	0	57.6	3.41E+03	Ci			1.25E+01	uCi/ml	100	1000	2.44E+06	1E+05	2.44E+01
79-Se	6.02E+01	Ci	0	57.6	2.55E+01	Ci		9.32E-02	0.00E+00	uCi/ml	100	1000	1.83E+05	1E+05	1.83E+00
Beta	0.00E+00	Ci	0	57.6	0.00E+00	Ci	6.84E+01	4.93E+01	-1.18E+02	uCi/ml	100	1000	1.46E+08	1E+05	1.46E+03
90-Sr	5.54E+06	Ci	0	66.4	1.86E+06	Ci	3.05E-05	3.05E-03	6.79E+03	uCi/ml	100	1000	1.33E+09	1E+05	1.33E+04
90-Y	5.54E+06	Ci	0	66.4	1.86E+06	Ci	3.05E-05	3.05E-03	6.79E+03	uCi/ml	100	1000	1.33E+09	1E+05	1.33E+04
93-Zr	2.72E+02	Ci	0	57.6	1.15E+02	Ci			4.21E-01	uCi/ml	100	1000	8.26E+04	1E+05	8.26E-01
93m-Nb	2.13E+02	Ci	0	57.6	9.04E+01	Ci			3.30E-01	uCi/ml	100	1000	6.48E+04	1E+05	6.48E-01
99-Tc	1.70E+03	Ci	0	57.6	7.21E+02	Ci		2.63E+00	0.00E+00	uCi/ml	100	1000	5.16E+06	1E+05	5.16E+01
106-Ru	5.85E-02	Ci	0	57.6	2.48E-02	Ci			9.06E-05	uCi/ml	100	1000	1.78E+01	1E+05	1.78E-04
106-Rh	5.85E-02	Ci	0	57.6	2.48E-02	Ci			9.06E-05	uCi/ml	100	1000	1.78E+01	1E+05	1.78E-04
107-Pd	1.10E+01	Ci	0	57.6	4.66E+00	Ci			1.70E-02	uCi/ml	100	1000	3.34E+03	1E+05	3.34E-02
113m-Cd	1.46E+03	Ci	0	57.6	6.17E+02	Ci			2.25E+00	uCi/ml	100	1000	4.42E+05	1E+05	4.42E+00
121m-Sn	1.57E+01	Ci	0	57.6	6.64E+00	Ci			2.42E-02	uCi/ml	100	1000	4.76E+03	1E+05	4.76E-02
126-Sn	1.04E+02	Ci	0	57.6	4.41E+01	Ci			1.61E-01	uCi/ml	100	1000	3.16E+04	1E+05	3.16E-01
125-Sb	9.82E+02	Ci	0	57.6	4.16E+02	Ci			1.52E+00	uCi/ml	100	1000	2.98E+05	1E+05	2.98E+00
126-Sb	1.46E+01	Ci	0	57.6	6.17E+00	Ci			2.25E-02	uCi/ml	100	1000	4.42E+03	1E+05	4.42E-02
126m-Sb	1.04E+02	Ci	0	57.6	4.41E+01	Ci			1.61E-01	uCi/ml	100	1000	3.16E+04	1E+05	3.16E-01
125m-Te	2.41E+02	Ci	0	57.6	1.02E+02	Ci			3.72E-01	uCi/ml	100	1000	7.31E+04	1E+05	7.31E-01
129-I	2.10E-01	Ci	0	57.6	8.90E-02	Ci		3.25E-04	0.00E+00	uCi/ml	100	1000	6.38E+02	1	6.38E+02

PVS Release Rate

median of six most recent analyses

	U	alpha	beta	Pu	Pu-236	Pu-239,2	Cs-137	Sr-90
	ug/ml	uCi/ml	uCi/ml	uCi/ml	uCi/ml	uCi/ml	uCi/ml	uCi/ml
tank 8D1	4.30E+01	8.3E-03	6.8E+01	2.5E-04	1.6E-04	6.0E-05	4.63E+01	3.1E-05
tank 8D2	9.96E+01	0.0E+00	4.9E+01	1.2E-03	8.8E-04	3.4E-04	4.95E+01	3.1E-03

Mob Pump	on	off
hr/yr =	8766	8.77E+03

V,8D-1,l=	274000
V,8D-2,l=	274000

Plenum Temp, F =	8.00E+01	1.00E+02
P,H2O, psia =	5.00E-01	9.30E-01
Air Sweep, scfm =	2.50E+02	2.50E+02
Evap, ml/hr =	1.20E+04	2.24E+04

DF	
TDS evap	1.00E+02
TSS evap	1.00E+03
PVS	1.00E+05

Prior Removal

IRTS = 0 VF = 57.6 (Fe2O3 basis)

Radionuclide	Estimated Total Inventory				Analyses				Evaporation Source				Calculate
					Soluble		Insoluble		DF		Evap	DF	Released
	Initial Inventory	IRTS Removal, %	VF Removal, %	Net	Tank8D1	Tank 8D2	Tank 8D2		TDS	TSS	uCi/yr	PVS	uCi/yr
134-Cs	3.51E+02 Ci	0	69.6	1.07E+02 Ci	2.70E-03	2.89E-03	3.83E-01	uCi/ml	100	1000	8.38E+04	1E+05	8.38E-01
135-Cs	1.61E+02 Ci	0	69.6	4.89E+01 Ci	1.24E-03	1.33E-03	1.76E-01	uCi/ml	100	1000	3.85E+04	1E+05	3.85E-01
137-Cs	6.01E+06 Ci	0	69.6	1.83E+06 Ci	4.63E+01	4.95E+01	6.57E+03	uCi/ml	100	1000	1.44E+09	1E+05	1.44E+04
137m-Ba	5.68E+06 Ci	0	69.6	1.73E+06 Ci	4.38E+01	4.68E+01	6.21E+03	uCi/ml	100	1000	1.36E+09	1E+05	1.36E+04
144-Ce	5.25E-04 Ci	0	57.6	2.22E-04 Ci			8.12E-07	uCi/ml	100	1000	1.59E-01	1E+05	1.59E-06
144-Pr	5.25E-04 Ci	0	57.6	2.22E-04 Ci			8.12E-07	uCi/ml	100	1000	1.59E-01	1E+05	1.59E-06
146-Pm	3.97E+00 Ci	0	57.6	1.68E+00 Ci			6.15E-03	uCi/ml	100	1000	1.21E+03	1E+05	1.21E-02
147-Pm	1.06E+04 Ci	0	57.6	4.50E+03 Ci			1.64E+01	uCi/ml	100	1000	3.22E+06	1E+05	3.22E+01
151-Sm	7.93E+04 Ci	0	57.6	3.36E+04 Ci			1.23E+02	uCi/ml	100	1000	2.41E+07	1E+05	2.41E+02
152-Eu	2.43E+02 Ci	0	57.6	1.03E+02 Ci			3.76E-01	uCi/ml	100	1000	7.38E+04	1E+05	7.38E-01
154-Eu	5.03E+04 Ci	0	57.6	2.13E+04 Ci			7.78E+01	uCi/ml	100	1000	1.53E+07	1E+05	1.53E+02
155-Eu	7.79E+03 Ci	0	57.6	3.30E+03 Ci			1.21E+01	uCi/ml	100	1000	2.37E+06	1E+05	2.37E+01
207-Tl	9.76E+00 Ci	0	57.6	4.14E+00 Ci			1.51E-02	uCi/ml	100	1000	2.96E+03	1E+05	2.96E-02
208-Tl	3.05E+00 Ci	0	57.6	1.29E+00 Ci			4.72E-03	uCi/ml	100	1000	9.27E+02	1E+05	9.27E-03
209-Pb	0.00E+00 Ci	0	57.6	0.00E+00 Ci			0.00E+00	uCi/ml	100	1000	0.00E+00	1E+05	0.00E+00
211-Pb	9.79E+00 Ci	0	57.6	4.15E+00 Ci			1.51E-02	uCi/ml	100	1000	2.97E+03	1E+05	2.97E-02
212-Pb	8.50E+00 Ci	0	57.6	3.61E+00 Ci			1.32E-02	uCi/ml	100	1000	2.58E+03	1E+05	2.58E-02
211-Bi	9.79E+00 Ci	0	57.6	4.15E+00 Ci			1.51E-02	uCi/ml	100	1000	2.97E+03	1E+05	2.97E-02
212-Bi	8.50E+00 Ci	0	57.6	3.61E+00 Ci			1.32E-02	uCi/ml	100	1000	2.58E+03	1E+05	2.58E-02
213-Bi	0.00E+00 Ci	0	57.6	0.00E+00 Ci			0.00E+00	uCi/ml	100	1000	0.00E+00	1E+05	0.00E+00
212-Po	5.45E+00 Ci	0	57.6	2.31E+00 Ci			8.43E-03	uCi/ml	100	1000	1.66E+03	1E+05	1.66E-02
213-Po	0.00E+00 Ci	0	57.6	0.00E+00 Ci			0.00E+00	uCi/ml	100	1000	0.00E+00	1E+05	0.00E+00
215-Po	9.79E+00 Ci	0	57.6	4.15E+00 Ci			1.51E-02	uCi/ml	100	1000	2.97E+03	1E+05	2.97E-02
216-Po	8.50E+00 Ci	0	57.6	3.61E+00 Ci			1.32E-02	uCi/ml	100	1000	2.58E+03	1E+05	2.58E-02

PVS Release Rate

median of six most recent analyses:

	U	alpha	beta	Pu	Pu-236	Pu-239,2	Cs-137	Sr-90
	ug/ml	uCi/ml	uCi/ml	uCi/ml	uCi/ml	uCi/ml	uCi/ml	uCi/ml
tank 8D1	4.30E+01	8.3E-03	6.8E+01	2.5E-04	1.6E-04	6.0E-05	4.63E+01	3.1E-05
tank 8D2	9.96E+01	0.0E+00	4.9E+01	1.2E-03	8.8E-04	3.4E-04	4.95E+01	3.1E-03

Mob Pump	on	off
hr/yr =	8766	8.77E+03

V,8D-1,l=	274000
V,8D-2,l=	274000

Plenum Temp, F =	8.00E+01	1.00E+02
P,H2O, psia =	5.00E-01	9.30E-01
Air Sweep, scfm =	2.50E+02	2.50E+02
Evap, ml/hr =	1.20E+04	2.24E+04

DF	
TDS evap	1.00E+02
TSS evap	1.00E+03
PVS	1.00E+05

Prior Removal

IRTS = 0 VF = 57.6 (Fe2O3 basis)

Radionuclide	Estimated Total Inventory				Analyses				Evaporation Source				Calculate
					Soluble		Insoluble		DF		Evap	DF	Released
	Initial Inventory	IRTS Removal, %	VF Removal, %	Net	Tank8D1	Tank 8D2	Tank 8D2		TDS	TSS	uCi/yr	PVS	uCi/yr
217-At	0.00E+00 Ci	0	57.6	0.00E+00 Ci			0.00E+00	uCi/ml	100	1000	0.00E+00	1E+05	0.00E+00
219-Rn	9.79E+00 Ci	0	57.6	4.15E+00 Ci			1.51E-02	uCi/ml	100	1000	2.97E+03	1	2.97E+03
220-Rn	8.50E+00 Ci	0	57.6	3.61E+00 Ci			1.32E-02	uCi/ml	100	1000	2.58E+03	1	2.58E+03
221-Fr	0.00E+00 Ci	0	57.6	0.00E+00 Ci			0.00E+00	uCi/ml	100	1000	0.00E+00	1E+05	0.00E+00
223-Fr	1.35E-01 Ci	0	57.6	5.73E-02 Ci			2.09E-04	uCi/ml	100	1000	4.10E+01	1E+05	4.10E-04
223-Ra	9.79E+00 Ci	0	57.6	4.15E+00 Ci			1.51E-02	uCi/ml	100	1000	2.97E+03	1E+05	2.97E-02
224-Ra	8.50E+00 Ci	0	57.6	3.61E+00 Ci			1.32E-02	uCi/ml	100	1000	2.58E+03	1E+05	2.58E-02
225-Ra	0.00E+00 Ci	0	57.6	0.00E+00 Ci			0.00E+00	uCi/ml	100	1000	0.00E+00	1E+05	0.00E+00
228-Ra	1.59E+00 Ci	0	57.6	6.75E-01 Ci			2.46E-03	uCi/ml	100	1000	4.83E+02	1E+05	4.83E-03
225-Ac	0.00E+00 Ci	0	57.6	0.00E+00 Ci			0.00E+00	uCi/ml	100	1000	0.00E+00	1E+05	0.00E+00
227-Ac	9.79E+00 Ci	0	57.6	4.15E+00 Ci			1.51E-02	uCi/ml	100	1000	2.97E+03	1E+05	2.97E-02
228-Ac	1.59E+00 Ci	0	57.6	6.75E-01 Ci			2.46E-03	uCi/ml	100	1000	4.83E+02	1E+05	4.83E-03
227-Th	9.65E+00 Ci	0	57.6	4.09E+00 Ci			1.49E-02	uCi/ml	100	1000	2.93E+03	1E+05	2.93E-02
228-Th	8.50E+00 Ci	0	57.6	3.61E+00 Ci			1.32E-02	uCi/ml	100	1000	2.58E+03	1E+05	2.58E-02
229-Th	2.17E-01 Ci	0	57.6	9.19E-02 Ci			3.35E-04	uCi/ml	100	1000	6.58E+01	1E+05	6.58E-04
230-Th	5.88E-02 Ci	0	57.6	2.49E-02 Ci			9.10E-05	uCi/ml	100	1000	1.79E+01	1E+05	1.79E-04
231-Th	1.01E-01 Ci	0	57.6	4.28E-02 Ci			1.56E-04	uCi/ml	100	1000	3.07E+01	1E+05	3.07E-04
232-Th	1.64E+00 Ci	0	57.6	6.95E-01 Ci			2.54E-03	uCi/ml	100	1000	4.98E+02	1E+05	4.98E-03
234-Th	0.00E+00 Ci	0	57.6	0.00E+00 Ci			0.00E+00	uCi/ml	100	1000	0.00E+00	1E+05	0.00E+00
231-Pa	1.52E+01 Ci	0	57.6	6.44E+00 Ci			2.35E-02	uCi/ml	100	1000	4.62E+03	1E+05	4.62E-02
233-Pa	0.00E+00 Ci	0	57.6	0.00E+00 Ci			0.00E+00	uCi/ml	100	1000	0.00E+00	1E+05	0.00E+00
234m-Pa	0.00E+00 Ci	0	57.6	0.00E+00 Ci			0.00E+00	uCi/ml	100	1000	0.00E+00	1E+05	0.00E+00
U	0.00E+00 kg	0	78.73	5.52E+05 g	4.30E+01	9.96E+01		ug/ml	100	1000	2.41E+08	1E+05 (mg)	2.41E+03
232-U	6.76E+00 Ci	0	78.73	1.44E+00 Ci	1.12E-04	2.59E-04	4.87E-03	uCi/ml	100	1000	1.58E+03	1E+05	1.58E-02

PVS Release Rate

median of six most recent analyses.

	U	alpha	beta	Pu	Pu-236	Pu-239,2	Cs-137	Sr-90
	ug/ml	uCi/ml	uCi/ml	uCi/ml	uCi/ml	uCi/ml	uCi/ml	uCi/ml
tank 8D1	4.30E+01	8.3E-03	6.8E+01	2.5E-04	1.6E-04	6.0E-05	4.63E+01	3.1E-05
tank 8D2	9.96E+01	0.0E+00	4.9E+01	1.2E-03	8.8E-04	3.4E-04	4 95E+01	3 1E-03

Mob Pump

	on	off
hr/yr =	8766	8 77E+03

V,8D-1,l=	274000
V,8D-2,l=	274000

Plenum Temp, F =	8 00E+01	1 00E+02
P,H2O, psia =	5.00E-01	9.30E-01
Air Sweep, scfm =	2.50E+02	2 50E+02
Evap, ml/hr =	1 20E+04	2 24E+04

DF

TDS evap	1 00E+02
TSS evap	1 00E+03
PVS	1 00E+05

Prior Removal

IRTS = 0 VF = 57 6 (Fe2O3 basis)

Radionuclide	Estimated Total Inventory					Analyses				Evaporation Source				Calculate
						Soluble		Insoluble		DF		Evap	DF	Released
	Initial Inventory		IRTS Removal, %	VF Removal, %	Net	Tank8D1	Tank 8D2	Tank 8D2		TDS	TSS	uCi/yr	PVS	uCi/yr
233-U	9.53E+00	Ci	0	78 73	2 03E+00 Ci	1 58E-04	3 66E-04	6 87E-03	uCi/ml	100	1000	2 23E+03	1E+05	2.23E-02
234-U	4 66E+00	Ci	0	78.73	9 90E-01 Ci	7 71E-05	1 79E-04	3 36E-03	uCi/ml	100	1000	1.09E+03	1E+05	1.09E-02
233+234U	0.00E+00	Ci	0	78.73	3.02E+00 Ci	2 35E-04	5.45E-04	1 02E-02	uCi/ml	100	1000	3.33E+03	1E+05	3.33E-02
235-U	1 01E-01	Ci	0	78 73	2 15E-02 Ci	1.67E-06	3.88E-06	7.29E-05	uCi/ml	100	1000	2 37E+01	1E+05	2.37E-04
236-U	2 96E-01	Ci	0	78 73	6.30E-02 Ci	4.91E-06	1 14E-05	2.14E-04	uCi/ml	100	1000	6.94E+01	1E+05	6.94E-04
235+236U	0.00E+00	Ci	0	78 73	8 45E-02 Ci	6.58E-06	1.52E-05	2 86E-04	uCi/ml	100	1000	9.31E+01	1E+05	9.31E-04
238-U	8.54E-01	Ci	0	78 73	1.82E-01 Ci	1 41E-05	3.28E-05	6 16E-04	uCi/ml	100	1000	2.00E+02	1E+05	2.00E-03
alpha	0 00E+00	Ci	0	57.6	0 00E+00 Ci	8 33E-03	0 00E+00		uCi/ml	100	1000	8 79E+03	1E+05	8.79E-02
236-Np	9.47E+00	Ci	0	57.6	4.02E+00 Ci			1 47E-02	uCi/ml	100	1000	2 88E+03	1E+05	2.88E-02
237-Np	2.35E+01	Ci	0	57.6	9.98E+00 Ci			3 64E-02	uCi/ml	100	1000	7.15E+03	1E+05	7.16E-02
239-Np	3.47E+02	Ci	0	57 6	1 47E+02 Ci			5 37E-01	uCi/ml	100	1000	1 05E+05	1E+05	1.05E+00
Pu	0.00E+00	Ci	0	57 6	4.58E+03 Ci	2.48E-04	1 23E-03	1.67E+01	uCi/ml	100	1000	3.28E+06	1E+05	3.28E+01
236-Pu	8 43E-01	Ci	0	57.6	3.57E-01 Ci	1.82E-08	9 70E-08	1 30E-03	uCi/ml	100	1000	2.56E+02	1E+05	2.56E-03
238-Pu	7 92E+03	Ci	0	57.6	3.36E+03 Ci	1.64E-04	8.83E-04	1.23E+01	uCi/ml	100	1000	2.41E+06	1E+05	2.41E+01
239-Pu	1 65E+03	Ci	0	57.6	7 00E+02 Ci	3.56E-05	1.90E-04	2.55E+00	uCi/ml	100	1000	5 02E+05	1E+05	5.02E+00
240-Pu	1.22E+03	Ci	0	57.6	5.18E+02 Ci	2.63E-05	1.40E-04	1 89E+00	uCi/ml	100	1000	3.71E+05	1E+05	3.71E+00
239+240Pu	0.00E+00	Ci	0	57.6	1.22E+03 Ci	6.02E-05	3.44E-04	4 44E+00	uCi/ml	100	1000	8.73E+05	1E+05	8.73E+00
241-Pu	5.57E+04	Ci	0	57.6	2.36E+04 Ci	1.20E-03	6 40E-03	8 61E+01	uCi/ml	100	1000	1.69E+07	1E+05	1.69E+02
242-Pu	1.65E+00	Ci	0	57.6	7.00E-01 Ci	3.56E-08	1.90E-07	2 55E-03	uCi/ml	100	1000	5.02E+02	1E+05	6.02E-03
241-Am	5.35E+04	Ci	0	57.6	2.27E+04 Ci			8 28E+01	uCi/ml	100	1000	1.63E+07	1E+05	1.63E+02
242-Am	2.85E+02	Ci	0	57.6	1.21E+02 Ci			4 41E-01	uCi/ml	100	1000	8.66E+04	1E+05	8.66E-01
242m-Am	2.86E+02	Ci	0	57.6	1.21E+02 Ci			4 43E-01	uCi/ml	100	1000	8.70E+04	1E+05	8.70E-01
243-Am	3.47E+02	Ci	0	57.6	1.47E+02 Ci			5 37E-01	uCi/ml	100	1000	1.05E+05	1E+05	1.05E+00
242-Cm	2.37E+02	Ci	0	57.6	1.01E+02 Ci			3 67E-01	uCi/ml	100	1000	7.21E+04	1E+05	7.21E-01

PVS Release Rate

median of six most recent analyses

	U	alpha	beta	Pu	Pu-236	Pu-239,2	Cs-137	Sr-90
	ug/ml	uCi/ml	uCi/ml	uCi/ml	uCi/ml	uCi/ml	uCi/ml	uCi/ml
tank 8D1	4.30E+01	8.3E-03	6.8E+01	2.5E-04	1.6E-04	6.0E-05	4.63E+01	3.1E-05
tank 8D2	9.96E+01	0.0E+00	4.9E+01	1.2E-03	8.8E-04	3.4E-04	4.95E+01	3.1E-03

Mob Pump	on	off
hr/yr =	8766	8.77E+03

V,8D-1,l=	274000
V,8D-2,l=	274000

Plenum Temp, F =	8.00E+01	1.00E+02
P,H2O, psia =	5.00E-01	9.30E-01
Air Sweep, scfm =	2.50E+02	2.50E+02
Evap, ml/hr =	1.20E+04	2.24E+04

DF	
TDS evap	1.00E+02
TSS evap	1.00E+03
PVS	1.00E+05

Prior Removal

IRTS = 0 VF = 57.6 (Fe2O3 basis)

Radionuclide	Estimated Total Inventory						Analyses				Evaporation Source				Calculate
							Soluble		Insoluble		DF		Evap	DF	Released
	Initial Inventory		IRTS Removal, %	VF Removal, %	Net		Tank8D1	Tank 8D2	Tank 8D2		TDS	TSS	uCi/yr	PVS	uCi/yr
243-Cm	1.10E+02	Ci	0	57.6	4.68E+01	Ci			1.71E-01	uCi/ml	100	1000	3.36E+04	1E+05	**3.36E-01**
244-Cm	5.62E+03	Ci	0	57.6	2.38E+03	Ci			8.70E+00	uCi/ml	100	1000	1.71E+06	1E+05	**1.71E+01**
245-Cm	8.81E-01	Ci	0	57.6	3.73E-01	Ci			1.36E-03	uCi/ml	100	1000	2.68E+02	1E+05	**2.68E-03**
246-Cm	1.01E-01	Ci	0	57.6	4.28E-02	Ci			1.56E-04	uCi/ml	100	1000	3.07E+01	1E+05	**3.07E-04**

ATTACHMENT B: DOSE ASSESSMENT

C A P 8 8 - P C

Version 1.00

Clean Air Act Assessment Package - 1988

S Y N O P S I S   R E P O R T

Non-Radon Individual Assessment

Jan 21, 1998 10:15 am

Facility: West Valley Demonstration Project
Address: Box 191
10282 Rock Springs Road
City: West Valley
State: NY Zip: 14171-0191

Source Category: Ground Level ARP
Source Type: Stack
Emission Year: 1998

Comments: Assessment for Request for Approval, Jan. 1998
(radionuclides 1-34) Mob. Pump Run = 8766 hours

Dataset Name: STS 8766 HRS #1
Dataset Date: Jan 21, 1998 10:14 am
Wind File: WNDFILES\5YRAV10M.WND

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 1400 Meters North
Lifetime Fatal Cancer Risk: 2.95E-06

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
GONADS	1.03E-01
BREAST	9.85E-02
R MAR	2.69E-01
LUNGS	8.25E-02
THYROID	8.67E-01
ENDOST	5.01E-01
RMNDR	9.01E-02
EFFEC	1.51E-01

RADIONUCLIDE EMISSIONS DURING THE YEAR 1998

Nuclide	Class	Size	Source #1 Ci/y	TOTAL Ci/y
H-3	*	0.00	1.6E+01	1.6E+01
C-14	*	0.00	4.2E-07	4.2E-07
FE-55	W	1.00	2.5E-07	2.5E-07
CO-60	Y	1.00	8.2E-07	8.2E-07
NI-59	W	1.00	3.2E-07	3.2E-07
NI-63	W	1.00	2.4E-05	2.4E-05
SE-79		0.00	1.8E-06	1.8E-06
SR-90	D	1.00	1.3E-02	1.3E-02
Y-90	Y	1.00	1.3E-02	1.3E-02
ZR-93	W	1.00	8.3E-07	8.3E-07
NB-93M	Y	1.00	6.5E-07	6.5E-07
TC-99	W	1.00	5.2E-05	5.2E-05
RU-106	Y	1.00	1.8E-10	1.8E-10
RH-106	Y	1.00	1.8E-10	1.8E-10
PD-107	Y	1.00	3.3E-08	3.3E-08
CD-113M		0.00	4.4E-06	4.4E-06
SN-126	W	1.00	3.2E-07	3.2E-07
SB-125	W	1.00	3.0E-06	3.0E-06
SB-126	W	1.00	4.4E-08	4.4E-08
SB-126M	W	1.00	3.2E-07	3.2E-07
TE-125M	W	1.00	7.3E-07	7.3E-07
I-129	D	1.00	6.4E-04	6.4E-04
CS-134	D	1.00	8.4E-07	8.4E-07
CS-135	D	1.00	3.8E-07	3.8E-07
CS-137	D	1.00	1.4E-02	1.4E-02
BA-137M	D	1.00	1.4E-02	1.4E-02
CE-144	Y	1.00	1.6E-12	1.6E-12
PR-144	Y	1.00	1.6E-12	1.6E-12
PM-147	Y	1.00	3.2E-05	3.2E-05
SM-151	W	1.00	2.4E-04	2.4E-04
EU-152	W	1.00	7.4E-07	7.4E-07
EU-154	W	1.00	1.5E-04	1.5E-04
EU-155	W	1.00	2.4E-05	2.4E-05
FR-223	D	1.00	4.1E-10	4.1E-10

SITE INFORMATION

Temperature:	8 degrees C
Precipitation:	104 cm/y
Mixing Height:	1000 m

SOURCE INFORMATION

Source Number:	1
Stack Height (m):	10.06
Diameter (m):	0.47
Plume Rise Momentum (m/s): (Exit Velocity)	1.22E+01

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	0.700	0.399	0.442
Fraction From Assessment Area:	0.300	0.601	0.558
Fraction Imported:	0.000	0.000	0.000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

1400 1800 1900 2100 2200 2300 2400 2500 2700 3000
3100 3300

C A P 8 8 - P C

Version 1.00

Clean Air Act Assessment Package - 1988

D O S E   A N D   R I S K   E Q U I V A L E N T   S U M M A R I E S

Non-Radon Individual Assessment
Jan 21, 1998 10:15 am

Facility: West Valley Demonstration Project
Address: Box 191
10282 Rock Springs Road
City: West Valley
State: NY   Zip: 14171-0191

Source Category: Ground Level ARP
Source Type: Stack
Emission Year: 1998

Comments: Assessment for Request for Approval, Jan. 1998
(radionuclides 1-34) Mob. Pump Run = 8766 hours

Dataset Name: STS 8766 HRS #1
Dataset Date: Jan 21, 1998 10:14 am
Wind File: WNDFILES\5YRAV10M.WND

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)
GONADS	1.03E-01
BREAST	9.85E-02
R MAR	2.69E-01
LUNGS	8.25E-02
THYROID	8.67E-01
ENDOST	5.01E-01
RMNDR	9.01E-02
EFFEC	1.51E-01

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)
INGESTION	7.72E-02
INHALATION	3.95E-03
AIR IMMERSION	4.13E-07
GROUND SURFACE	6.97E-02
INTERNAL	8.11E-02
EXTERNAL	6.97E-02
TOTAL	1.51E-01

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem/y)
H-3	7.55E-03
C-14	9.78E-09
FE-55	2.15E-09
CO-60	4.60E-06
NI-59	3.11E-09
NI-63	2.11E-07
SE-79	0.00E+00
SR-90	3.77E-02
Y-90	9.05E-05
ZR-93	3.40E-08
NB-93M	5.21E-08
TC-99	2.65E-05
RU-106	8.68E-11
RH-106	1.51E-17
PD-107	3.80E-10
CD-113M	0.00E+00
SN-126	5.26E-07
SB-125	1.74E-06
SB-126	3.15E-09
SB-126M	1.27E-10
TE-125M	2.06E-08
I-129	2.45E-02
CS-134	2.16E-06
CS-135	5.70E-08
CS-137	1.26E-02
BA-137M	6.76E-02
CE-144	6.03E-13
PR-144	5.84E-17
PM-147	1.10E-06
SM-151	5.74E-06
EU-152	4.11E-06
EU-154	6.83E-04
EU-155	4.47E-06
FR-223	4.56E-13
TOTAL	1.51E-01

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
LEUKEMIA	7.82E-07
BONE	7.40E-08
THYROID	1.63E-07
BREAST	3.85E-07
LUNG	4.09E-07
STOMACH	2.47E-07
BOWEL	1.37E-07
LIVER	2.76E-07
PANCREAS	1.69E-07
URINARY	1.04E-07
OTHER	2.07E-07
TOTAL	2.95E-06

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	1.21E-06
INHALATION	8.68E-08
AIR IMMERSION	9.88E-12
GROUND SURFACE	1.66E-06
INTERNAL	1.29E-06
EXTERNAL	1.66E-06
TOTAL	2.95E-06

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
RA-223	4.41E-12
RA-224	1.43E-12
RA-228	2.75E-13
AC-227	1.18E-10
AC-228	5.68E-15
TH-227	6.56E-12
TH-228	9.09E-11
TH-229	2.35E-12
TH-230	2.57E-13
TH-231	6.26E-18
TH-232	7.06E-12
PA-231	9.04E-11
U-232	4.43E-11
U-233	2.80E-11
U-234	1.35E-11
U-235	2.88E-13
U-236	8.17E-13
U-238	2.23E-12
NP-237	1.31E-10
NP-239	8.22E-14
PU-236	2.85E-12
PU-238	4.89E-08
PU-239	1.01E-08
PU-240	7.48E-09
PU-241	2.61E-09
PU-242	9.60E-12
AM-241	3.31E-07
AM-242	5.19E-13
AM-242M	1.56E-09
AM-243	2.13E-09
CM-242	1.41E-10
CM-243	5.38E-10
CM-244	2.31E-08
CM-245	5.57E-12
CM-246	6.27E-13
TOTAL	4.28E-07

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	1400	1800	1900	2100	2200	2300	2400
N	7.8E-02	5.8E-02	5.4E-02	4.9E-02	4.7E-02	4.5E-02	4.3E-02
NNW	6.4E-02	4.8E-02	4.6E-02*	4.2E-02	4.0E-02	3.8E-02	3.7E-02
NW	3.0E-02	2.1E-02	2.0E-02	1.8E-02	1.7E-02	1.6E-02	1.5E-02
WNW	1.2E-02	8.3E-03	7.7E-03	6.7E-03	6.3E-03	6.0E-03	5.6E-03
W	8.1E-03	5.6E-03	5.2E-03	4.5E-03	4.3E-03	4.0E-03	3.8E-03
WSW	6.0E-03	4.1E-03	3.8E-03	3.3E-03	3.1E-03	2.9E-03	2.8E-03
SW	6.9E-03	4.7E-03	4.4E-03	3.8E-03	3.6E-03	3.3E-03	3.1E-03
SSW	6.5E-03	4.4E-03	4.1E-03	3.6E-03	3.3E-03	3.1E-03	2.9E-03
S	1.0E-02	6.9E-03	6.3E-03	5.4E-03	5.1E-03	4.7E-03	4.4E-03
SSE	2.8E-02	1.9E-02	1.7E-02	1.5E-02	1.4E-02	1.3E-02	1.2E-02
SE	5.4E-02	3.6E-02	3.3E-02	2.8E-02	2.6E-02	2.4E-02	2.3E-02
ESE	4.2E-02	2.9E-02	2.6E-02	2.3E-02	2.1E-02	2.0E-02	1.8E-02
E	3.6E-02	2.5E-02	2.3E-02	2.0E-02	1.8E-02	1.7E-02	1.6E-02
ENE	3.4E-02	2.4E-02	2.2E-02	1.9E-02	1.8E-02	1.7E-02	1.6E-02
NE	4.7E-02	3.3E-02	3.1E-02	2.7E-02	2.5E-02	2.3E-02	2.2E-02
NNE	5.8E-02	4.1E-02	3.8E-02	3.4E-02	3.2E-02	3.0E-02	2.8E-02

	Distance (m)				
Direction	2500	2700	3000	3100	3300
N	4.1E-02	3.9E-02	3.5E-02	3.4E-02	3.2E-02
NNW	3.6E-02	3.4E-02	3.1E-02	3.0E-02	2.9E-02
NW	1.4E-02	1.3E-02	1.1E-02	1.1E-02	1.0E-02
WNW	5.3E-03	4.8E-03	4.2E-03	4.1E-03	3.8E-03
W	3.6E-03	3.2E-03	2.8E-03	2.7E-03	2.5E-03
WSW	2.6E-03	2.4E-03	2.1E-03	2.0E-03	1.9E-03
SW	3.0E-03	2.7E-03	2.3E-03	2.2E-03	2.1E-03
SSW	2.8E-03	2.5E-03	2.2E-03	2.1E-03	1.9E-03
S	4.2E-03	3.7E-03	3.2E-03	3.1E-03	2.8E-03
SSE	1.1E-02	9.9E-03	8.4E-03	8.0E-03	7.3E-03
SE	2.1E-02	1.9E-02	1.6E-02	1.5E-02	1.4E-02
ESE	1.7E-02	1.5E-02	1.3E-02	1.2E-02	1.1E-02
E	1.5E-02	1.3E-02	1.1E-02	1.1E-02	9.9E-03
ENE	1.5E-02	1.3E-02	1.1E-02	1.1E-02	9.8E-03
NE	2.1E-02	1.9E-02	1.6E-02	1.5E-02	1.4E-02
NNE	2.7E-02	2.4E-02	2.1E-02	2.0E-02	1.9E-02

Shaded values indicate the location of the nearest residence in the designated direction. *Location of the MEOSI

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	1400	1800	1900	2100	2200	2300	2400
N	4.3E-07	3.2E-07	3.0E-07	2.7E-07	2.6E-07	2.5E-07	2.4E-07
NNW	3.5E-07	2.6E-07	2.5E-07	2.3E-07	2.2E-07	2.1E-07	2.0E-07
NW	1.6E-07	1.2E-07	1.1E-07	9.6E-08	9.1E-08	8.6E-08	8.2E-08
WNW	6.4E-08	4.5E-08	4.2E-08	3.7E-08	3.4E-08	3.2E-08	3.1E-08
W	4.4E-08	3.1E-08	2.8E-08	2.5E-08	2.3E-08	2.2E-08	2.0E-08
WSW	3.2E-08	2.2E-08	2.1E-08	1.8E-08	1.7E-08	1.6E-08	1.5E-08
SW	3.8E-08	2.6E-08	2.4E-08	2.1E-08	1.9E-08	1.8E-08	1.7E-08
SSW	3.5E-08	2.4E-08	2.2E-08	1.9E-08	1.8E-08	1.7E-08	1.6E-08
S	5.6E-08	3.7E-08	3.4E-08	3.0E-08	2.8E-08	2.6E-08	2.4E-08
SSE	1.6E-07	1.0E-07	9.5E-08	8.1E-08	7.5E-08	7.0E-08	6.5E-08
SE	3.0E-07	2.0E-07	1.8E-07	1.6E-07	1.4E-07	1.3E-07	1.3E-07
ESE	2.3E-07	1.6E-07	1.4E-07	1.2E-07	1.1E-07	1.1E-07	1.0E-07
E	2.0E-07	1.4E-07	1.2E-07	1.1E-07	1.0E-07	9.3E-08	8.7E-08
ENE	1.9E-07	1.3E-07	1.2E-07	1.0E-07	9.7E-08	9.1E-08	8.5E-08
NE	2.6E-07	1.8E-07	1.7E-07	1.5E-07	1.4E-07	1.3E-07	1.2E-07
NNE	3.2E-07	2.3E-07	2.1E-07	1.8E-07	1.7E-07	1.6E-07	1.5E-07

	Distance (m)				
Direction	2500	2700	3000	3100	3300
N	2.3E-07	2.1E-07	1.9E-07	1.9E-07	1.8E-07
NNW	2.0E-07	1.9E-07	1.7E-07	1.7E-07	1.6E-07
NW	7.8E-08	7.1E-08	6.2E-08	6.0E-08	5.6E-08
WNW	2.9E-08	2.6E-08	2.3E-08	2.2E-08	2.0E-08
W	1.9E-08	1.7E-08	1.5E-08	1.5E-08	1.4E-08
WSW	1.4E-08	1.3E-08	1.1E-08	1.1E-08	9.9E-09
SW	1.6E-08	1.4E-08	1.2E-08	1.2E-08	1.1E-08
SSW	1.5E-08	1.3E-08	1.2E-08	1.1E-08	1.0E-08
S	2.3E-08	2.0E-08	1.7E-08	1.7E-08	1.5E-08
SSE	6.1E-08	5.4E-08	4.6E-08	4.3E-08	4.0E-08
SE	1.2E-07	1.0E-07	8.7E-08	8.3E-08	7.6E-08
ESE	9.4E-08	8.3E-08	7.0E-08	6.7E-08	6.1E-08
E	8.2E-08	7.3E-08	6.2E-08	5.9E-08	5.4E-08
ENE	8.0E-08	7.2E-08	6.1E-08	5.9E-08	5.4E-08
NE	1.1E-07	1.0E-07	8.7E-08	8.4E-08	7.7E-08
NNE	1.5E-07	1.3E-07	1.2E-07	1.1E-07	1.0E-07

C A P 8 8 - P C

Version 1.00

Clean Air Act Assessment Package - 1988

S Y N O P S I S   R E P O R T

Non-Radon Individual Assessment

Jan 21, 1998 10:15 am

Facility: West Valley Demonstration Project
Address: Box 191
10282 Rock Springs Road
City: West Valley
State: NY   Zip: 14171-0191

Source Category: Ground Level ARP
Source Type: Stack
Emission Year: 1998

Comments: Assessment for Request for Approval, Jan. 1998
(radionuclides 35-69) Mob. Pump Run = 8766 hours

Dataset Name: STS 8766 HRS #2
Dataset Date: Jan 21, 1998 10:15 am
Wind File: WNDFILES\5YRAV10M.WND

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 1400 Meters North
Lifetime Fatal Cancer Risk: 4.28E-07

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
GONADS	1.67E-02
BREAST	1.75E-03
R MAR	1.05E-01
LUNGS	3.79E-02
THYROID	1.69E-03
ENDOST	1.30E+00
RMNDR	5.78E-02
EFFEC	7.80E-02

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem/y)
RA-223	1.98E-07
RA-224	6.39E-08
RA-228	2.77E-08
AC-227	1.38E-05
AC-228	2.82E-10
TH-227	2.40E-07
TH-228	4.54E-06
TH-229	3.23E-07
TH-230	3.15E-08
TH-231	2.15E-13
TH-232	1.25E-06
PA-231	1.67E-05
U-232	5.49E-06
U-233	2.19E-06
U-234	1.06E-06
U-235	2.20E-08
U-236	6.39E-08
U-238	1.73E-07
NP-237	2.60E-05
NP-239	2.72E-09
PU-236	1.62E-07
PU-238	5.77E-03
PU-239	1.30E-03
PU-240	9.58E-04
PU-241	6.85E-04
PU-242	1.23E-06
AM-241	6.48E-02
AM-242	3.54E-08
AM-242M	3.33E-04
AM-243	4.18E-04
CM-242	9.31E-06
CM-243	8.96E-05
CM-244	3.59E-03
CM-245	1.10E-06
CM-246	1.25E-07
TOTAL	7.80E-02

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
LEUKEMIA	8.91E-08
BONE	5.73E-08
THYROID	2.11E-10
BREAST	1.71E-09
LUNG	7.44E-08
STOMACH	1.12E-09
BOWEL	6.53E-10
LIVER	2.01E-07
PANCREAS	8.15E-10
URINARY	4.44E-10
OTHER	9.96E-10
TOTAL	4.28E-07

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	2.47E-08
INHALATION	4.02E-07
AIR IMMERSION	2.93E-14
GROUND SURFACE	1.42E-09
INTERNAL	4.27E-07
EXTERNAL	1.42E-09
TOTAL	4.28E-07

C A P 8 8 - P C

Version 1.00

Clean Air Act Assessment Package - 1988

D O S E   A N D   R I S K   E Q U I V A L E N T   S U M M A R I E S

Non-Radon Individual Assessment
Jan 21, 1998 10:15 am

Facility: West Valley Demonstration Project
Address: Box 191
10282 Rock Springs Road
City: West Valley
State: NY Zip: 14171-0191

Source Category: Ground Level ARP
Source Type: Stack
Emission Year: 1998

Comments: Assessment for Request for Approval, Jan. 1998
(radionuclides 35-69) Mob. Pump Run = 8766 hours

Dataset Name: STS 8766 HRS #2
Dataset Date: Jan 21, 1998 10:15 am
Wind File: WNDFILES\5YRAV10M.WND

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)
GONADS	1.67E-02
BREAST	1.75E-03
R MAR	1.05E-01
LUNGS	3.79E-02
THYROID	1.69E-03
ENDOST	1.30E+00
RMNDR	5.78E-02
EFFEC	7.80E-02

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)
INGESTION	5.10E-03
INHALATION	7.29E-02
AIR IMMERSION	1.40E-09
GROUND SURFACE	6.79E-05
INTERNAL	7.80E-02
EXTERNAL	6.79E-05
TOTAL	7.80E-02

RADIONUCLIDE EMISSIONS DURING THE YEAR 1998

Nuclide	Class	Size	Source #1 Ci/y	TOTAL Ci/y
RA-223	W	1.00	3.0E-08	3.0E-08
RA-224	W	1.00	2.6E-08	2.6E-08
RA-228	W	1.00	4.8E-09	4.8E-09
AC-227	Y	1.00	3.0E-08	3.0E-08
AC-228	Y	1.00	4.8E-09	4.8E-09
TH-227	Y	1.00	2.9E-08	2.9E-08
TH-228	Y	1.00	2.6E-08	2.6E-08
TH-229	Y	1.00	6.6E-10	6.6E-10
TH-230	Y	1.00	1.8E-10	1.8E-10
TH-231	Y	1.00	3.1E-10	3.1E-10
TH-232	Y	1.00	5.0E-09	5.0E-09
PA-231	Y	1.00	4.6E-08	4.6E-08
U-232	Y	1.00	1.6E-08	1.6E-08
U-233	Y	1.00	2.2E-08	2.2E-08
U-234	Y	1.00	1.1E-08	1.1E-08
U-235	Y	1.00	2.4E-10	2.4E-10
U-236	Y	1.00	6.9E-10	6.9E-10
U-238	Y	1.00	2.0E-09	2.0E-09
NP-237	W	1.00	7.1E-08	7.1E-08
NP-239	W	1.00	1.1E-06	1.1E-06
PU-236	Y	1.00	2.6E-09	2.6E-09
PU-238	Y	1.00	2.4E-05	2.4E-05
PU-239	Y	1.00	5.0E-06	5.0E-06
PU-240	Y	1.00	3.7E-06	3.7E-06
PU-241	Y	1.00	1.7E-04	1.7E-04
PU-242	Y	1.00	5.0E-09	5.0E-09
AM-241	W	1.00	1.6E-04	1.6E-04
AM-242	W	1.00	8.7E-07	8.7E-07
AM-242M	W	1.00	8.7E-07	8.7E-07
AM-243	W	1.00	1.1E-06	1.1E-06
CM-242	W	1.00	7.2E-07	7.2E-07
CM-243	W	1.00	3.4E-07	3.4E-07
CM-244	W	1.00	1.7E-05	1.7E-05
CM-245	W	1.00	2.7E-09	2.7E-09
CM-246	W	1.00	3.1E-10	3.1E-10

SITE INFORMATION

Temperature: 8 degrees C
Precipitation: 104 cm/y
Mixing Height: 1000 m

SOURCE INFORMATION

Source Number:	1
Stack Height (m):	10.06
Diameter (m):	0.47
Plume Rise Momentum (m/s): (Exit Velocity)	1.22E+01

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	0.700	0.399	0.442
Fraction From Assessment Area:	0.300	0.601	0.558
Fraction Imported:	0.000	0.000	0.000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

1400 1800 1900 2100 2200 2300 2400 2500 2700 3000
3100 3300

NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
H-3	2.04E-07
C-14	2.39E-13
FE-55	5.08E-14
CO-60	1.14E-10
NI-59	7.17E-14
NI-63	4.82E-12
SE-79	0.00E+00
SR-90	6.36E-07
Y-90	3.09E-09
ZR-93	3.14E-13
NB-93M	1.02E-12
TC-99	9.72E-10
RU-106	3.94E-15
RH-106	3.62E-22
PD-107	1.07E-14
CD-113M	0.00E+00
SN-126	9.94E-12
SB-125	4.17E-11
SB-126	7.49E-14
SB-126M	3.09E-15
TE-125M	3.81E-13
I-129	1.45E-07
CS-134	5.40E-11
CS-135	1.45E-12
CS-137	3.29E-07
BA-137M	1.62E-06
CE-144	2.73E-17
PR-144	1.64E-21
PM-147	4.68E-11
SM-151	1.10E-10
EU-152	9.89E-11
EU-154	1.65E-08
EU-155	1.00E-10
FR-223	4.81E-18
TOTAL	2.95E-06

INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	1400	1800	1900	2100	2200	2300	2400
N	1.5E-01	1.1E-01	1.1E-01	9.6E-02	9.2E-02	8.8E-02	8.5E-02
NNW	1.3E-01	9.8E-02	9.3E-02*	8.5E-02	8.2E-02	7.9E-02	7.6E-02
NW	6.2E-02	4.7E-02	4.4E-02	4.0E-02	3.8E-02	3.7E-02	3.5E-02
WNW	3.0E-02	2.4E-02	2.3E-02	2.1E-02	2.0E-02	2.0E-02	1.9E-02
W	2.4E-02	1.9E-02	1.9E-02	1.7E-02	1.7E-02	1.7E-02	1.6E-02
WSW	2.0E-02	1.7E-02	1.6E-02	1.5E-02	1.5E-02	1.5E-02	1.4E-02
SW	2.2E-02	1.8E-02	1.7E-02	1.6E-02	1.6E-02	1.6E-02	1.5E-02
SSW	2.1E-02	1.8E-02	1.7E-02	1.6E-02	1.6E-02	1.5E-02	1.5E-02
S	2.8E-02	2.2E-02	2.1E-02	2.0E-02	1.9E-02	1.8E-02	1.8E-02
SSE	6.1E-02	4.5E-02	4.2E-02	3.7E-02	3.5E-02	3.4E-02	3.2E-02
SE	1.1E-01	7.4E-02	6.9E-02	6.1E-02	5.7E-02	5.4E-02	5.1E-02
ESE	8.2E-02	5.9E-02	5.5E-02	4.8E-02	4.6E-02	4.3E-02	4.1E-02
E	7.0E-02	5.1E-02	4.8E-02	4.2E-02	4.0E-02	3.8E-02	3.6E-02
ENE	6.8E-02	5.0E-02	4.7E-02	4.2E-02	4.0E-02	3.8E-02	3.6E-02
NE	9.1E-02	6.6E-02	6.2E-02	5.5E-02	5.2E-02	4.9E-02	4.7E-02
NNE	1.1E-01	8.0E-02	7.5E-02	6.6E-02	6.3E-02	6.0E-02	5.7E-02

	Distance (m)				
Direction	2500	2700	3000	3100	3300
N	8.2E-02	7.7E-02	7.0E-02	6.8E-02	6.4E-02
NNW	7.4E-02	7.0E-02	6.4E-02	6.2E-02	5.9E-02
NW	3.4E-02	3.2E-02	2.9E-02	2.8E-02	2.7E-02
WNW	1.9E-02	1.8E-02	1.7E-02	1.6E-02	1.6E-02
W	1.6E-02	1.5E-02	1.4E-02	1.4E-02	1.4E-02
WSW	1.4E-02	1.4E-02	1.3E-02	1.3E-02	1.3E-02
SW	1.5E-02	1.4E-02	1.4E-02	1.4E-02	1.3E-02
SSW	1.5E-02	1.4E-02	1.4E-02	1.3E-02	1.3E-02
S	1.7E-02	1.7E-02	1.6E-02	1.5E-02	1.5E-02
SSE	3.1E-02	2.9E-02	2.6E-02	2.5E-02	2.4E-02
SE	4.9E-02	4.4E-02	3.9E-02	3.8E-02	3.5E-02
ESE	3.9E-02	3.6E-02	3.2E-02	3.1E-02	2.9E-02
E	3.5E-02	3.2E-02	2.9E-02	2.8E-02	2.6E-02
ENE	3.5E-02	3.2E-02	2.9E-02	2.8E-02	2.6E-02
NE	4.5E-02	4.1E-02	3.7E-02	3.6E-02	3.4E-02
NNE	5.5E-02	5.0E-02	4.5E-02	4.3E-02	4.1E-02

Shaded values indicate the location of the nearest residence in the designated direction. *Location of the MEOSI

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	1400	1800	1900	2100	2200	2300	2400
N	3.0E-06	2.2E-06	2.1E-06	1.9E-06	1.8E-06	1.8E-06	1.7E-06
NNW	2.5E-06	1.9E-06	1.8E-06	1.7E-06	1.6E-06	1.6E-06	1.5E-06
NW	1.2E-06	9.0E-07	8.5E-07	7.7E-07	7.4E-07	7.1E-07	6.8E-07
WNW	5.6E-07	4.4E-07	4.2E-07	3.9E-07	3.8E-07	3.6E-07	3.5E-07
W	4.3E-07	3.5E-07	3.4E-07	3.2E-07	3.1E-07	3.0E-07	2.9E-07
WSW	3.6E-07	3.0E-07	2.9E-07	2.7E-07	2.7E-07	2.6E-07	2.5E-07
SW	4.0E-07	3.3E-07	3.1E-07	2.9E-07	2.9E-07	2.8E-07	2.7E-07
SSW	3.9E-07	3.2E-07	3.1E-07	2.9E-07	2.8E-07	2.7E-07	2.6E-07
S	5.2E-07	4.1E-07	3.9E-07	3.6E-07	3.5E-07	3.4E-07	3.3E-07
SSE	1.2E-06	8.5E-07	8.0E-07	7.1E-07	6.7E-07	6.4E-07	6.1E-07
SE	2.0E-06	1.5E-06	1.4E-06	1.2E-06	1.1E-06	1.1E-06	1.0E-06
ESE	1.6E-06	1.2E-06	1.1E-06	9.5E-07	9.0E-07	8.5E-07	8.1E-07
E	1.4E-06	1.0E-06	9.4E-07	8.3E-07	7.9E-07	7.5E-07	7.2E-07
ENE	1.3E-06	9.7E-07	9.1E-07	8.2E-07	7.8E-07	7.4E-07	7.0E-07
NE	1.8E-06	1.3E-06	1.2E-06	1.1E-06	1.0E-06	9.7E-07	9.3E-07
NNE	2.1E-06	1.6E-06	1.5E-06	1.3E-06	1.2E-06	1.2E-06	1.1E-06

	Distance (m)				
Direction	2500	2700	3000	3100	3300
N	1.6E-06	1.5E-06	1.4E-06	1.4E-06	1.3E-06
NNW	1.5E-06	1.4E-06	1.3E-06	1.2E-06	1.2E-06
NW	6.5E-07	6.1E-07	5.6E-07	5.4E-07	5.1E-07
WNW	3.4E-07	3.3E-07	3.0E-07	3.0E-07	2.9E-07
W	2.8E-07	2.7E-07	2.6E-07	2.5E-07	2.5E-07
WSW	2.5E-07	2.4E-07	2.3E-07	2.3E-07	2.2E-07
SW	2.7E-07	2.5E-07	2.4E-07	2.4E-07	2.3E-07
SSW	2.6E-07	2.5E-07	2.4E-07	2.3E-07	2.3E-07
S	3.2E-07	3.0E-07	2.8E-07	2.8E-07	2.7E-07
SSE	5.8E-07	5.4E-07	4.9E-07	4.7E-07	4.5E-07
SE	9.5E-07	8.7E-07	7.7E-07	7.4E-07	6.9E-07
ESE	7.7E-07	7.0E-07	6.2E-07	6.0E-07	5.7E-07
E	6.8E-07	6.3E-07	5.6E-07	5.4E-07	5.1E-07
ENE	6.7E-07	6.2E-07	5.6E-07	5.4E-07	5.1E-07
NE	8.8E-07	8.1E-07	7.3E-07	7.0E-07	6.6E-07
NNE	1.1E-06	1.0E-06	8.9E-07	8.6E-07	8.1E-07

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10278

WVDP-387-01
Supernatant Treatment Ventilation System
Approval to Construct/Modify
Sources of Airborne Radionuclide Emissions

In compliance with provisions of the Clean Air Act, as amended (42 U.S.C. §7401 et. seq.) the Department of Energy West Valley Demonstration Project Office is granted interim approval to construct/modify sources WVDP-387-01, located at the West Valley Demonstration Project Site in West Valley, New York. This approval is granted in accordance with the plans and materials submitted with the applications and with Federal Regulations governing the National Emission Standards for Hazardous Air Pollutants (40 CFR Part 61), Subpart H. Any conditions attached to this document are considered part of this approval.

Failure to comply with any conditions or terms set forth in this approval may result in sanctions available under the authority of section 1-604 of Executive Order 12088 as well as enforcement procedures established by the Clean Air Act.

This approval to construct/modify grants no relief from the responsibility for compliance with other applicable provisions of Federal regulations. This approval shall be effective immediately after receipt of the approval to construct/modify by the applicant.

Dated October 5, 1987

Regional Administrator

Permit Conditions

I. Emergency Notification

A. In the event of an accidental/unplanned release of radionuclides which leads to an air emission that may cause the standards of 40 CFR 61 to be exceeded; or may result in a health threat to the public; the DOE-WVDP shall make timely notification to state, local and Federal agencies.

B. Initial phone notification should include the time of the accident/release; location of accident/release; estimate of quantity release; emergency steps taken to contain/control the release; type of assistance needed; and the name and title of person reporting the incident. A brief written summary of the event shall be submitted to Director, Air & Waste Management Division (Attn: Regional Radiation Representative) within 30 days of the event.

C. EPA Phone Notification - In Order of Preference

1. Region II - Regional Radiation Representative
   Paul A. Giardina
   Work - 212-264-4418
   After Hours - 201-548-8730

2. Region II - Radiation Safety Officer
   Shawn W. Googins
   Work - 212-264-6459
   Home - 201-846-0489

3. Region II - Health Physicist
   Larainne Koehler
   Work - 212-264-0546
   Home - 201-627-0018

4. Region II - 24 Hour Emergency Hotline
   201-548-8730

D. New York State Radiological Health Contact

1. New York State Warning Point
   518-457-2200

2. Backup Number (New York State Police)
   518-456-6811

3. New York State Director of Bureau of Environmental Radiation Protection
   Dr. Karim Rimawi
   Work - 518-458-6461
   Off-Duty - 518-439-0865

4. New York State Chief of Environmental Radiation Section
   William Condon
   Work - 518-458-6459
   Off-Duty - 518-463-3704

II. Permit Expiration

A. This interim approval to construct/modify will remain in effect until final approval is granted by the Regional Administrator or his designee. The approval to Construct/Modify is not transferable to another owner/operator.

B. The Department of Energy (DOE) may submit to the Regional Administrator (Region II Air & Waste Management Director) a written application for a determination of whether actions intended to be taken by the DOE/WVDP Office constitute a modification or construction of a source subject to the standard. The Regional Administrator will notify the owner or operator of his determination within 30 days after receiving sufficient information to evaluate the application (40 CFR 61.06)

C. If intended actions to be taken by the WVDP are determined to constitute construction/modification which effects an existing permitted source, the new permit and conditions shall supercede and/or amend the existing permit.

D. Updates in notification requirements and phone contacts supercede previous permit conditions.

III. Notification of Startup

A. The owner or operator of each stationary source which will have an initial startup after the effective date of the standard shall provide written notification to the Administrator as follows:

1. The 30-60 day notification of anticipated startup for source WVDP-387-01 is waived.

2. A notification of actual date of startup of WVDP-387-01 (other than previous operations to protect worker health and safety as noted in your letter of June 30, 1987) within 15 days of that date.

IV. Facility Operation/Maintenance

The facility owner/operator shall maintain all equipment, facilities, and systems installed or used to achieve compliance with the standard (40 CFR 61.92) in a manner consistent with good air pollution control practices for minimizing emissions. Operations, testing and maintenance of such air pollution control systems shall be conducted as noted in the pertinent general information sections (sections B, C, and D) included with your submissions/letter of August 4, 1987. These procedures are acceptable methods in the conduct of a good air pollution control program. Records of maintenance, inspection, testing, repair, monitoring data, and standard operating procedures for conducting such activities shall be maintained pursuant to 40 CFR 61.12 (c).

V. Severability

The provisions of this approval to construct/modify are severable, and, if any provision of this approval to construct/modify is held invalid, the remainder of this approval to construct/modify shall not be affected thereby.

VI. Other Applicable Regulations

The owner/operator of the West Valley Demonstration Project shall construct and operate the proposed source in compliance with all other applicable provisions of 40 CFR Parts 52, 60, and 61.

VIII. Agency Notification

A. All correspondence as required by this approval to construct/modify shall be sent to:

U.S. Environmental Protection Agency
Director, Air & Waste Management Division
Attention: Regional Radiation Representative
2 AWM
26 Federal Plaza
New York, New York 10278

REQUEST FOR APPROVAL TO CONSTRUCT OR MODIFY
SOURCES OF ATMOSPHERIC EMISSIONS OF RADIONUCLIDES

I. NAME AND ADDRESS OF APPLICANT

U.S. Department of Energy
West Valley Demonstration Project Office
P.O. Box 191
West Valley, New York 14171-0191

Operating Contractor:

West Valley Nuclear Services Co., Inc.
P.O. Box 191
West Valley, New York 14171-0191

II. NAME AND LOCATION OF SOURCE

RVS

Name: Supernatant Treatment System Ventilation System

Location: West Valley Demonstration Project
Rock Springs Road
West Valley, New York

Latitude: 42° 27'N

Longitude: 78° 39'W

Date of Construction/Modification: March 1984

Date of Startup: April 15, 1987

(Note: See WVDP General Information Section A for source location map; site boundary, dose receptor location and other general site information.)

III. RELEASE POINT INFORMATION

Emission Point ID:	STSHV
Ground Elevation (Ft MSL):	1407'
Stack Height (Ft):	33'
Height Above Structure (Ft):	18'
Inside Dimensions (Inches):	18.5"
Exit Temperature (°F):	100°
Exit Velocity (Ft/Sec):	35 normal; 66 maximum
Exit Volume (ACFM):	4000 normal; 7500 maximum

IV. TECHNICAL INFORMATION ABOUT SOURCE

A. Overview of Operations

The Supernatant Treatment System (STS) is designed to concentrate the radioactivity (primarily Cs-137) in the liquid phase of the PUREX high level radioactive waste presently stored in an underground tank (designated tank 8D-2) at the WVDP. The concentrated activity will be temporarily stored until it can be blended with the remaining high level waste and fed to the vitrification system for processing into a borosilicate glass. The cesium-stripped supernatant (decontaminated supernatant) will be processed into a low level waste cement form. The STS includes the following process steps:

- Supernatant Mobilization and Transfer

  A vertical turbine pump in tank 8D-2 will be used to decant the supernatant from tank 8D-2 and transfer it via jacketed pipes in a buried pipe conduit through the valve aisle to the supernatant prefilter and collection tank located within the modified spare high level waste tank 8D-1.

- Supernatant Filtering and Cooling

  The raw supernatant must be filtered to remove suspended fines (sludge particles), diluted with water, and cooled from approximately 90°C to 6°C for optimum processing conditions. The prefilter and supernatant cooler are located within tank 8D-1. The STS chiller, which supplies the cooling fluid (salt solution) to the cooler, is located in the STS support building.

O Ion Exchange

Following filtration and cooling, the supernatant is passed through three (3) in series ion exchange columns containing a cesium specific zeolite. The majority of the cesium dissolved in the supernatant (>99%) transfers to the ion exchange media. The ion exchange columns are located in tank 8D-1.

O Decontaminated Supernatant Collection and Transfer

Following ion exchange, the decontaminated (cesium stripped) supernatant is filtered to remove suspended zeolite fines and collected in a holding tank (spare Thorex high level waste tank 8D-3). Following sampling, it is transferred to the Liquid Waste Treatment System (LWTS) via underground lines for incorporation in cement as a low-level waste in the Cement Solidification System (CSS).

O Spent Zeolite Discharge

The cesium loaded ion exchange medium (zeolite) is not regenerated, but rather is discharged from the STS ion exchange columns to the bottom of tank 8D-1. Columns are valved out of the processing series (when zeolite is maximally loaded) for discharge one at a time. The discharged zeolite will be temporarily stored under water at the bottom of 8D-1 for ultimate transfer to the vitrification process for use as melter feed. Following discharge, the ion exchange column is recharged with fresh zeolite and is then available to be replaced into the ion exchange series.

B. Ventilation System Description

The STS heating and ventilation system consists of a supply system which provides heating and ventilation to the STS Control Room and other normally occupied areas in the STS Process Building, and an exhaust system which pulls air from the STS Process Building, primarily from the valve aisle and "top-of-tank structure" which houses the piping runs between the valve aisle and the process equipment installed in the modified spare high level storage tank, 8D-1. This ventilation system will be operated continuously throughout the radioactive operational life of the facility (including post processing decontamination).

The supply system provides approximately 4750 cfm of heated and filtered air to the STS Building and is located in this structure. The exhaust system is designed for a maximum of 7,500 cfm but will normally be operated at approximately 4,000 cfm. This system is located in a separate structure which houses a three (3) stage filter train comprised of parallel banks of roughing and double stage HEPA filters.

Ventilation air is drawn from the STS top-of-tank structure through a duct which joins an existing high-level waste tank farm ventilation duct. Valves are provided on this connection to allow the exhaust fan to ventilate the STS Building, and/or the high-level waste tanks. During normal STS operations, tanks 8D-1, 8D-2, and the STS process vessels in tank 8D-1 will be ventilated by the existing waste tank farm ventilation system, which exhausts through the process building main stack. Occasionally, work in the high-level waste tanks may require additional air flow for contamination control (especially when access ports to the tanks are opened for equipment installation). During these operations, the valve on the tank farm ventilation duct will be opened, and the tank farm isolated from the normal waste tank farm ventilation system, to allow the STS Ventilation System to draw additional airflow into the tank from the opened access port, assuring that contaminated air does not exit the tank from an unfiltered pathway.

Airflow in the STS Building will be from clean areas to areas with a higher potential for contamination. Filtered supply air will be provided to the zeolite and fresh water area and to a heating and recirculating system for the control room. From these areas it will pass to the lower level of the building to the operating aisle. HEPA filtered ducts in this area provide equal airflow (approximately 1,800 cfm each) to the valve aisle and the top-of-tank structure. Air flows from the valve aisle to the top-of-tank structure and the entire volume is drawn through the tank farm duct to the exhaust filtration system.

The STS Building Ventilation System is shown in Drawings 903D-418, 903D-419 and 903D-420. The STS exhaust ventilation building is shown in Drawing 900D-1175, which also shows the location of the exhaust filter trains, blowers, stack and stack sampling location. The duct between the STS Building, (top of tank structure) and ventilation exhaust building is shown in Drawing 900D-1176.

in PVS Bldg

Ventilation exhaust is routed through a single stage roughing filter and double stage HEPA filters. Parallel filter trains are provided for backup and to allow for continuous operation through filter changeout. The exhaust fan is electrically driven with back-up electricity provided by a diesel powered generator in the STS exhaust building. Details of the exhaust filtration system are shown in Drawing ESK-1743-3412-1 and filter monitoring instrumentation arrangement are shown in Drawing ESK-1743-3412-3.

Following filtration, the exhaust is routed through a 19 inch diameter stack to a release point approximately 33 ft above ground level. This release is sampled and monitored in accordance with criteria identified in WVDP General Information Section B - Ventilation Exhaust Monitoring.

The exhaust filter trains are instrumented and monitored in accordance with criteria identified in WVDP General Information Section C - Ventilation Exhaust Filter Monitoring. Prior to startup and after each changeout, HEPA filters are DOP tested in accordance with the requirements of WVDP General Information Section D - DOP Test Procedures and Acceptance Test Criteria.

C. Source Term Development

The source term for operation of the STS Ventilation System is based on continuous operation of the ventilation system for the STS Building and an annual usage of 100 hours ventilating the high level waste storage tanks. The basic radiological source terms are based on the radionuclide distribution of Purex Supernatant normalized to 1 curie of Cs-137 as shown on Table STS-1.

In the safety analysis for STS, it was assumed that 0.01% of the total volume of supernatant treated in STS would leak into the valve aisle, ventilated by the STS Ventilation System. (This equates to approximately 190 litres per year). Using a partition coefficient of 1000 for evaporating pool releases (per ANSI N46.1-1980) on the supernatant with a concentration of Cs-137 at 3.8 curies per liter, approximately 1 curie of Cs-137 is drawn into the ventilation system per year of operation, along with a proportional amount of other nuclides (except tritium, which is released in total).

Decay heat from the high level waste vaporizes approximately 125 litres/hr of the supernatant, which is essentially the source term for the high level waste tank from the ventilation system. Using the same release assumptions as above and assuming 100 hours of operation in this mode, approximately 48 curies of Cs-137 would enter the STS Ventilation System. Adding this source to the STS Building ventilation source results in a total of approximately 49 curies of Cs-137 entering the STS Ventilation System per year.

Using a decontamination factor (DF) of 10^5 for two stage HEPA filtration (ANSI N46.1-1980) the STS Ventilation System would discharge approximately 490 µCi/yr Cs-137. Using a DF of 1 for H-3 the annual release would be 6.9 E+5 µCi/yr. Other nuclides associated with this release are identified in Table STS-2, which also presents the corresponding radiological dose data.

D. Dose Assessment

The radiological impacts to the maximally exposed off-site resident from releases from the STS ventilation system are presented in Table STS-2. Whole body and organ doses are calculated by the AIRDOS-EPA (version CAAC) model as described in WVDP General Information - Section E. Effective dose equivalents calculated using the WVDP variable trajectory atmospheric dispersion model described in WVDP General Information - Section F, coupled to the AIRDOS-EPA dose assessment code are also presented for comparison.

In both cases the source is modeled as a ground level release for conservatism because the release point is not sufficiently above the Process Building to avoid wake effects.

The safety analysis report for the Supernatant Treatment System estimates the radiological impacts for failure of this ventilation system. A HEPA filter fire was analyzed and it was determined to result in an effective dose equivalent of 0.18 mrem to the maximally exposed off-site individual. This scenario represents the upper bounds of potential impacts associated with maloperation of this ventilation system.

E. List of Drawings

903D-418	STS Building HVAC Floor Plan Elevation 92.00 ft.
903D-419	STS Building HVAC Floor Plan Elevation 107.00 ft.
903D-420	STS Building HVAC Sections and Details

E. List of Drawings (Continued)

900D-1175	Tank Farm Ventilation and Service Building
900D-1176	Tank Farm Ventilation Piping and Service Building
ESK-1743-3412-1	General Arrangement - STS Ventilation System
ESK-1743-3412-3	Electrical and Gage Diagram - STS Ventilation System.

V References

ANSI N46.1-1980, Guidance for Defining Safety Related Features of Nuclear Fuel Cycle Facilities.

TABLE STS-1

SUPERNATANT RADIONUCLIDE COMPOSITION
FOR RADIONUCLIDES WITH TOTAL INVENTORY ≥ 1.0 CURIES

Isotope	TOTAL INVENTORY (Ci)	Normalized to Cesium-137
H-3	103	1.4×10^{-5}
C-14	137	1.8×10^{-5}
Ni-63	845	1.2×10^{-4}
Se-79	37	5.0×10^{-6}
Sr-90	2.9×10^{3}	4.0×10^{-4}
Y-90	2.9×10^{3}	4.0×10^{-4}
Tc-99	1.6×10^{3}	2.1×10^{-4}
Ru-106	2.8	3.8×10^{-7}
Rh-106	2.8	3.8×10^{-7}
Sb-125	72	9.7×10^{-6}
Te-125m	16.6	2.1×10^{-6}
Cs-134	1.94×10^{4}	2.6×10^{-3}
Cs-135	156	2.1×10^{-5}
Cs-137	7.43×10^{6}	1.0
Ba-137m	6.98×10^{6}	0.94
Pm-147	217	2.9×10^{-5}
Eu-154	14.9	2.0×10^{-6}
Eu-155	2.73	3.7×10^{-7}
Pu-238	130	1.7×10^{-5}
Pu-239	25	3.4×10^{-6}
Pu-240	19	2.6×10^{-6}
Pu-241	1.58×10^{3}	2.1×10^{-4}
Total	1.45×10^{7}	

TABLE STS-2

ESTIMATED ANNUAL DOSES FOR RELEASES FROM THE STS VENTILATION SYSTEM

Nuclide	Amount Released (uCi/yr)	Effective Dose Equivalent (rem)[1]	Whole Body Dose (rem)[2]	Organ Dose (rem)[2]	Organ[2]
H-3	6.9 E+5	2.6 E-7	7.6 E-7	7.6 E-7	Whole body
Sr-90	2.0 E-1	1.4 E-9	1.2 E-9	6.6 E-9	E.B.[3]
Tc-99	1.0 E-1	6.4 E-10	5.2 E-10	3.4 E-9	Stomach wall
Cs-134	1.3 E-0	9.4 E-9	3.5 E-9	4.3 E-9	Thyroid
Cs-137	4.9 E2	4.9 E-6	1.7 E-6	2.1 E-6	Thyroid
Pu-238	8.3 E-3	1.4 E-9	6.6 E-9	1.8 E-7	E.B.
Pu-239	1.7 E-3	3.2 E-10	1.5 E-9	4.4 E-8	E.B.
Pu-240	1.3 E-3	2.5 E-10	1.2 E-9	3.4 E-8	E.B.
Pu-241	1.0 E-1	3.9 E-10	2.0 E-9	6.1 E-8	E.B.
		5.2 E-6	2.5 E-6	2.1 E-6	Thyroid
				7.6 E-7	Whole Body
				3.3 E-7	E.B.

1 Based on WVDP Site Specific Dispersion (See WVDP General Information Section F) coupled to AIRDOS-EPA dose assessment code.

2 Values calculated by AIRDOS-EPA version CAAC - (See WVDP General Information - Section E).

3 E.B. = Endosteal Bone

WD:87:0437

West Valley
Nuclear Services Company
Incorporated

P.O. Box 191
West Valley, New York 14171-0191

July 9, 1987

JUL 1987
RECEIVED
DOE-WV

Dr. W. W. Bixby, Director
West Valley Project Office
U. S. Department of Energy
P. O. Box 191
West Valley, New York 14171-0191

Dear Dr. Bixby:

SUBJECT: NESHAPS Application Materials

Enclosed are the NESHAPS application materials for the following systems:

- Supernatant Treatment System
- Cement Solidification System
- Lag Storage/Super Compactor
- Contact Handled Size Reduction

In addition to the four facility specific packages, there is also a package of Project general information which provides overview materials and data common to the various systems and to the Project as a whole.

These materials are for your review and further disposition.

Very truly yours,

For C. J. Roberts, Manager
Safety and Environmental Assessment
West Valley Nuclear Services Co., Inc.

PCN:mcw

HE:87:0092

MCW0720:S/EA08

0344:87:10

Draft Eng Gt → JLK
6/25
to be issued by JEK
on 6/26

Project Management

:87:

June 25, 1987

STS and 01-14 Ventilation System

R. F. Gessner
J. L. Knabenschuh

R. E. Lawrence
S. Marchetti

cc: J. P. Englert
C. J. Roberts

MRC -

Based on discussions with representatives of EPA Region II during a meeting at the WVDP on June 17, 1987, discharge permits are required for potentially radioactive air emissions from the STS vent system ("PVS") and the 01-14 Building vent system. The Project is in the process of obtaining these permits, but until the applications are approved these systems are to be secured from further radioactive service.

The STS vent system is to remain out of service, with the existing waste tank farm ventilation system providing the necessary contamination control for the high-level waste tanks. The 01-14 Building ventilation system will remain in operation to provide control of existing contamination in the CSS cell, but the introduction or processing of radioactive materials through this system is to be deferred until an approved permit has been obtained. We anticipate that this will be about August 1, 1987.

Other ventilation and off-gas systems scheduled to enter radioactive service in the near term must have an approved discharge permit prior to hot operations. Questions concerning permit applications and their processing by ERA Region II should be referred to J. P. Englert or C. J. Roberts.

J. E. Krauss
President
West Valley Nuclear Services Co., Inc.

CJR:caf

CIN0206:SEA-69